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Editorial Director G. GEOFFREY SMITH, M.B.E.
Editor - - C. M. POULSEN
Assistant Editor - MAURICE A. SMITH, D.F.C. (WING CDR., R.A.F.V.R.)
Art Editor - - JOHN YOXALL

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The Outlook

Speed in Air Defence

THE Air Exercises which ended on September 6th were the first to take place in the United Kingdom since the end of the war. Three years of demobilization and of rebuilding the Royal Air Force lay behind those Exercises—three years of reluctant recruiting and slow re-equipment, and yet, by the evidence of the Exercises themselves, years of admirable training and of the upholding of high standards. Nothing done by the men and women who were engaged in the Exercises was open to criticism, no matter what past standards were called up for comparison. The new Air Force, in spirit and accomplishment, can be said to be worthy of its traditions. What it lacks is numbers. And because the numbers are relatively few, there remains a doubt as to whether or not the night defences did as well as they might have done towards the end of the Exercises if squadrons and staffs had not been tired.

Of the rigorous nature of the test to which they were subjected there can be no doubt. They were faced by the best night bomber force in the world, rich in knowledge of the ways of a concentrated fighter defence, as well versed in the arts of deception as a famous illusionist and equipped with all the best apparatus of navigation and target-finding. The odds undoubtedly were on the bombers and, lacking at present the information on which the umpires will base their verdict, the impression is that the favourite won at least on two of the four nights. An example of the difficulty the fighters found in making contact was afforded on the last night of the Exercises in the only big piece of clear sky which presented itself throughout the period. That night in Norfolk, the searchlights illuminated 23 aircraft; and the fighters intercepted seven of them.

Manpower, and therefore, aircraft power, may have had its effect, but the processes of night interception are influenced by deeper factors. No satisfactory antidote to "window" appears to have been found. Radar can still be prevented by it from identifying enemy aircraft with certainty and precision. Nor does there seem to be a marked improvement in the techniques of guiding the night fighter to its objective and of helping it in the critical last few miles to find and engage the enemy. Finally, the night-fighter system must always expect to have to deal with the tactical ingenuity which misleads it and draws off its forces to leave open a clear path for the main attack. If misfortunes born of these devices are to be put right, the time factor is evidently as important by night as by day. Speed is essential in the night fighter, and speed in this section of the defences has not advanced since the war ended. The time when jet fighters must be adapted to night duties cannot be far distant. Every improvement in bomber speeds is a warning that the time margins in air defence are shortening.

The same warnings ought to be appearing by now with some emphasis in the day-fighter scheme, but for some obscure reason they were omitted from these Exercises. The main burden of the daylight attack was borne by the B-29s. Speeds of about 300 m.p.h. were considered sufficient to test fighters capable of operational speeds of at least 550 m.p.h. Why the Hornets were not used at height to represent fast bombers has not been explained, and there can be no convincing explanation at a time when two of the major Powers already have jet bombers in the air. Air Exercises are devised in part to test efficiency and in part to practise all sections of the defence machine in those duties they would have to undertake if war should come. In this instance, the daylight operations were probably not undertaken at the pace which might be set by a determined enemy if war occurred within the next year. This can only be excused on the assumption that the rebuilt machine of defence is still being "run in."

Perhaps it should not be excused. It should be taken

instead as a danger signal. The Royal Air Force is now avowedly the nation's first line of defence. Any delay in preparing it for the tasks it might have to assume represents a risk which no government should be willing to take in the present state of international disunity. For safety as well as for efficiency reasons, there should never again be grounds for suspicion in British Air Exercises that the daylight offensive has been decelerated.

"Barrier" Broken

THERE could have been no more welcome culmination to an aircraft year, the activity during which was amply illustrated by the truly magnificent exhibition and display at Farnborough, than the news of John Derry's courageous flight in the D.H.108 research aircraft at a speed greater than that of sound. For weeks past a carefully planned programme calling for gradual increase in Mach Number (0.91, 0.92 to 0.96) has been observed, and after each increase there was a pause to consolidate the position. Then quite suddenly when flying over Windsor on a perfect morning, the pilot felt the opportunity had arrived for a great and adventurous step forward. In a brief space of seconds sound was overtaken and the aircraft, pulled out of its steep dive, was on its way back to Hatfield. It is too early to know what technical information has been gained from this epoch-making flight, but in simple terms, in view of the alarming predictions made with regard to airflow breakaway, severe turbulence and complete change in our conception of streamlining during flight in the transonic region, the fact that Derry and his aircraft were safe and sound on the tarmac within fifteen minutes of exceeding a Mach Number of one is the important fact.

Some details of this most creditable achievement are printed on page 334. Although the D.H.108 is a swept-back tail-less research aircraft, it is no rocket-propelled high-speed freak. On the contrary, its good every-day handling characteristics have been amply confirmed earlier during aerobatic displays at low level, and particularly on the occasion of its taking the international 100-km closed-circuit record. Moreover, its engine, an up-rated Goblin turbojet, is almost identical with that fitted to the standard Vampire fighter.

Certain points regarding the speed of sound and speed in m.p.h. at ground level may need to be brought into perspective. Derry's speed, measured in relation to the speed of sound, itself directly related to compressibility effects, at the 35,000ft-35 deg C conditions obtaining, is equal to a little under 700 m.p.h. This speed is some 20 m.p.h. faster than that of sound under the same conditions, but less by some 60 m.p.h. than at sea level. His airspeed indicator would be reading only about 420 m.p.h. in this rarified atmosphere, and it is the A.S.I. reading that gives a measure of the air loads on the structure of the aircraft, i.e., they were about the same as would be experienced at 420 m.p.h. at sea level. Nevertheless, the so-called sonic barrier has been pierced. Incidentally, the 108 is not pressurized, and the pilot therefore wore a special waistcoat and pressurized oxygen mask (not a g suit) to enable him to withstand the altitude.

Many questions have been asked about speed record possibilities. It should be remembered that the aircraft is not built to fly at very high Mach Numbers near the ground, nor has it the power to reach them in level flight. Its sea level maximum in present form is probably not more than 650 m.p.h.

We extend sincere congratulations to the designers and manufacturers of the first British aircraft to exceed the speed of sound, and to the first British pilot to do so in a home-produced aircraft.

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"Flight" photograph.

PUBLIC DAY: *A small corner of the vast crowd attending the S.B.A.C. Display and Exhibition on Saturday last when the show was opened to the public for the first time. The second public day on Sunday was almost entirely spoilt by rain and gales.*

Aircrew get aboard a "Southland" Lincoln night bomber.

AIR EXERCISES

Last-War Tactics Recalled : Jet Fighters Not Used at Night Nor Against "Southland's" Faster Types

THREE days and three nights of almost continuous work by air crews, ground crews and operations staffs were evidently expected by Bomber Command to make the defences ripe for overwhelming in the Air Exercises which ended on September 6th. From 22.00 hours on September 5th until well into the small hours, the bomber machine played all the tricks it knew. It indulged in decoy attacks on quite a big scale. It interfered with the radar. It spread its genuine attacks out over a wide area. It sheltered its biggest attack behind some of the smaller ones, and, relying on the fighters to expect another twist, impudently contined that main attack on London for more than an hour.

No one can complain that, in these exercises, the fighter machine was spared anything. That, of course, was a good thing, for in form and conception these were the old Air Exercises of long ago. "Southland's" bombers were to try to smash military targets in "Northland." Military targets were translated, in the liberal fashion established by Bomber Command during the war, to mean anything in "Northland" which could be held to contribute to the war effort. "Northland's" task was to detect, locate and destroy, by the joint effort of fighters and guns, as much of the marauding force as possible.

The old story seemed older than it ought because the bomber force bore so strong a resemblance to that which was still serving when the war ended more than three years ago. Lincolns and Lancasters did the work by night and B-29s, popularly known as Superfortresses, took most of the duty by day. There was a moderate-sized force of Hornets at the disposal of "Southland," but there was no sign that these were used for anything but intrusion and low attacks on airfields. The excitement we had promised ourselves of watching Meteors and Vampires trying to intercept these fast aircraft at 30,000 ft or more was denied us.

Nor were our hopes of night-flying jet fighters realized—a faint hope, perhaps, in view of the modifications that would be required to fit aircraft radar in them. The night fighters, too, seemed, therefore, to belong to the war era. On the well-tried Mosquitoes rested "Northland's" chance of turning the offensive tide at night. The cynic who remarked that the next war was evidently going to begin where the last one ended, had some justification in superficial appearances. What he and the rest of us could not assess in advance was the value of improvements made in the detection, communications and control machinery.

Of the nature of those improvements nothing can be disclosed. Some of them were made between 1941 and the end of the war, and then were never thoroughly tested by the enemy. Some additional changes have since been made. This was the first chance to find out how the improved system would work. The weather helped to make the trial stringent. From start to finish there was no good weather. Low clouds, towering storm clouds, coastal mists and drizzle gave a splendid variety of unpleasant conditions and robbed the defences of any element of luck. The weather even aided "Southland's" attempts to cause confusion.

R.O.C. Supplies the Answer

Take, for instance, the sequel to the first night's work. Only two of a fair-sized force of bombers had been able to get home after making their attacks. Next day, September 4th, the rest were returning to base just as the B-29s were delivering their first attack in strength. As the B-29s were adopting dispersal tactics in their approach, the movements of the benighted Lincolns and Lancasters might have been misleading, and perhaps they were, until the plots based on Royal Observer Corps reports showed them to be heading away from any likely targets. While those bombers plodded away on their homeward courses, the B-29s put in the most difficult of their attacks.

This also was an attempt to overload the defences, partly

Lord Tedder, Chief of Air Staff, visits the "Ops" room at Fighter Command H.Q. In the centre, wearing cap, is Air Marshal Sir William Elliot.

F/L. A. E. Tarry, briefing navigators of a Lincoln squadron at a "Southland" bomber station.

A night fighter Mosquito running up before take-off (the scanner can be clearly seen through the nose). During one raid squadrons from one station in south-east England estimated 35 "kills" from 29 sorties.

Air Exercises . . . . .

by giving them a large number of formations to cope with and partly by driving in simultaneously on two fronts. While eight or nine packets of bombers were approaching Yorkshire, Lincolnshire, Norfolk and Suffolk, a still bigger force was coming up towards London from the Channel, mostly across Kent. The day before, there had been a long warning of incoming bombers while they were still in the vicinity of the Channel Islands, and the Meteors were waiting for them confidently, on standing patrol near Selsey Bill—surely the first instance in history of the precious fuel of jet fighters being risked on a standing patrol.

On this occasion, with raiders coming in from half the points of the compass, the fighter groups took no such chances. They sent up the Meteors, Vampires and Spitfires on direct interception courses, and during this battle we had our best opportunity to gauge the interception schedule. The Superfortresses were at heights between 10,000 ft and 35,000 ft; and the fighters were chosen, so far as was possible, with some care as to rate of climb. The average time occupied in intercepting was about 15 minutes or about eight and a half minutes longer than the Meteor III needs to climb to 30,000 ft.

Plenty of interceptions were made, and many of them were made over the sea. Indeed, we concluded that a small time margin had been deliberately allowed by the controllers so as to make sure that the fighters should be in a position to deliver the favoured head-on attacks, particularly against aircraft of the B-29 type. This was the day on which some of the B-29s went on across England and "bombed" Liverpool, far outside "Northland's" territory, by way, possibly, of acknowledging gracefully that they had been intercepted.

By day, the fighter machine undoubtedly worked well, even to the point of delighting the gunners. They had arranged to short-circuit the communications system between the detection and plotting centres and the gun sites, cutting out some of the "middlemen." The gunners were loud in the approval of the change, which not only put them promptly on the mark but also gave them immediate warning of the onset and conclusion of a combat. The fighters always appeared to have the situation in hand. They were often busy, but they were never at a loss or too late. How well they fought and fired, only the umpires will know, when all the combat films have been developed. But we who watched would have liked to see them matched against the Hornets flying high and fast from behind the cover of a B-29 formation. We fancied, too, that the fighters would have welcomed the challenge.

"Dirty Tricks"

"Southland's" onslaught lacked that kind of tactical ingenuity by day. If anything, it was a little too orthodox; as though "Southland" were the schoolmaster setting problems to find out what these bright boys knew rather than to trip them up. No such pedagogic restraints withheld "Southland" by night. The whole repertoire of dirty tricks from "window" to decoys was performed, apparently with exactly the same results that infuriated the Germans in the days when they had sacrificed everything to fighter defence. The night bombers upset the defence on the second night of the Exercises; they upset the defences again on the last night of their operations. On this last occasion they did it thoroughly and ruthlessly. And by morning the Exercises had been called off. The Air Staff had obtained the information it wanted.

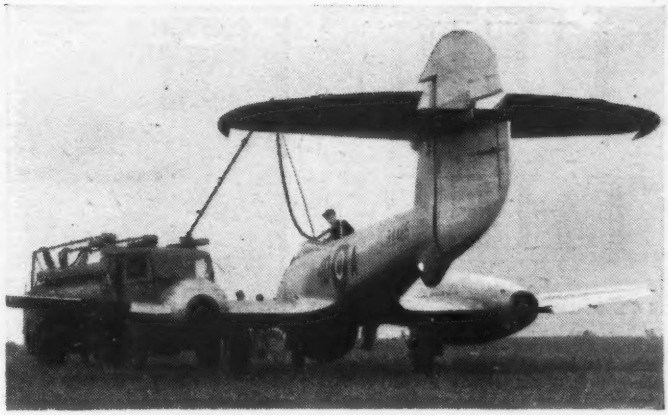
The onlooker may legitimately wonder what was being tested primarily in the night Exercises. Were we hopeful that the improvements in night fighter technique would show up in a largely increased percentage of interceptions? If so, there were no signs that that hope had been realized. Or were we anxious to discover what success the night bomber might still expect against the best defensive system it would be likely to meet? As the only nation which has persistently developed night bombing for 20 years, we might be excused a measure of satisfaction at finding the night bomber still extremely hard to catch. Or did we just seek reassurance that a new generation of night bomber crews has inherited the right tradition?

A crew of No. 77 Bomber Squadron, U.S.A.F. preparing their Superfortress for a raid on "Northland".

A glance at the story of that last night attack will show how well the night bombers were handled by the commander, and how well the crews must have flown to produce the desired effect. At 2230 hours two attacks on Grimsby and Harwich were identified, and fighters were sent up to meet them. The Harwich raid proved to be a decoy, but it drew off the fighters so that a much bigger force could slip through behind them, making for London from the North-East. Soon afterwards another big-scale attack was plotted near Kings Lynn, while minelaying aircraft added to the anxieties of the night-fighter controllers, and every effort was made by the bombers to fog the radar. There were several interceptions that night, but they were not numerous enough to stem the stream of bombers which attacked targets in the London area for more than an hour.

By the evidence of these Exercises, the R.A.F. may be well content that its main bomber force consists of night bombers. By the same evidence, the Air Staff may conclude that night-flying jet fighters could serve a useful purpose, employing their speed to switch from a decoy raid to the real attack, to make good a pursuit and to climb fast. On the other hand, the night bomber's best friend, when "window" or other anti-radar device is used, is the long sea approach. Something more than fogging the radar is needed over the land, where observer posts can do much to keep track of the night raider's tricks.

One other thing which ought to be said about these Exercises is that they proved the quality of new officers, airmen and airwomen who had no war experience. They made the machine work extremely well. At times, Fighter Command had only a vague idea of the target at which a bomber formation was aiming, but it always knew by day where the bombers were. If it was occasionally misled by night, no impartial observer would blame it or take upon himself with any confidence to point out how these weaknesses could be turned into strength. E. C. S.



Refuelling a Meteor at one of "Northland's" fighter stations.

FIGHTER COMMAND SUMMARY

BOMBER COMMAND have attacked in every way to make the defence of "Northland" difficult. Attacks have been made at varying heights and at varying strengths from one aircraft to major forces. These attacks have been spread over "Northland" and have exercised the defences thoroughly. In every phase the exercise and destruction rate has been satisfactory despite the adverse weather conditions.

By day and by night the weather has been bad. There has been cloud from low altitude up to great heights, there have been frequent rainstorms and the visibility has been generally poor. The weather has therefore provided ideal conditions for the test of a force capable of flying in all conditions.

It was necessary for the exercise to throw into gear the whole control and reporting machinery which had not been used as a whole since the end of the war. The restoration and maintenance of the landlines involved, has given the General Post Office a large part in the exercise. Very few controllers had had any actual experience of war conditions and many of the W.A.A.F. and airmen plotters were new to the job and unused to the long and tedious hours of work involved. During the week-end the system has been fortified by thousands of the Auxiliary personnel of the Air Defence Units and the volunteer members of the Royal Observer Corps, many of whom have travelled long distances in order to gain some experience in the area of the exercise. Distances travelled included journeys from central Scotland to Nottingham and the North Midlands to London, and in centres all over the country the Reserve forces and the Royal Observer Corps have been experiencing their first spell of wartime conditions and hours of work since the termination of hostilities. In the case of the Royal Observer Corps much of their spell of duty was necessarily spent out in the open in unpleasant weather conditions. For some of the recruits of the Auxiliary Services who did not see service during the war this exercise was their first tour of night operations.

Civil aircraft have been plotted in addition to the aircraft taking part, but there has been no interference with civil flying. Those taking part in the exercise have risen magnificently to the demands made upon them and have contributed in large measure to its success.

Despite difficult weather conditions a large number of interceptions have been made by day and by night by Regular and Auxiliary squadrons. No figures of aircraft judged to be destroyed will be available until the records are analysed but the number of interceptions made is satisfactory. The number of interceptions at sea was also considered satisfactory.

The Auxiliary squadrons operating under war conditions for the first time since the war and in some cases with no Regular assistance have achieved results comparable with the Regular squadrons. Nos. 504 (City of Nottingham) and 615 (County of Surrey) squadrons have been particularly successful. The Scottish Auxiliary squadron also did good work.

Among the many features of the exercise is the excellent way in which the Royal Auxiliary Air Force and the Air Defence Units have worked together with the Regular Air Force. The work of the W.A.A.F. in the plotting rooms and on stations has shown that they are able and willing to work under stress as were the W.A.A.F. in wartime.

Parallel with R.A.F. Fighter Command, Anti-Aircraft Command has taken its place in the defence scheme, both Territorial and Regular Anti-Aircraft Units have benefited greatly from the exercise and have gained as much valuable experience as the Royal Air Force.

BOMBER COMMAND SUMMARY

THE Air Officer Commanding-in-Chief R.A.F. Bomber Command, Air Marshal A. B. Ellwood, C.B., D.S.C., said: "Throughout the exercise the attacking forces of 'Southland' navigated their way to their targets through bad weather conditions, which included heavy cloud, stretching on occasions upwards from very low level to 30,000ft and delivered their attacks both by day and by night."

The enemy reacted violently to these attacks, nevertheless, heavy bombers forced their way in waves of fifty or more to bomb Clapham Junction, Vauxhall Bridge and electrical installations in the Chelsea area. The War Department in Whitehall was considered obliterated during one raid.

Forces of heavy United States Air Force bombers attacked industrial centres in Coventry, Nottingham, Leicester, Swindon, Reading and London.

"Southland" photographic reconnaissance aircraft ranged far and wide over enemy territory during the exercise and secured valuable information on the location of new "war factories."

Low level attacks were also made on enemy airfields in the Southern part of England and on two occasions a row of fighters were caught refuelling on the ground. They were attacked and when "Southland's" aircraft left the fighters were assumed to be burning furiously and the crews dashing for safety amidst exploding petrol bowsers, and at least thirty of the enemy's latest and most vaunted fighters were claimed to be destroyed.

During one of the attacks a night fighter controller was heard over the radio telephone vectoring his forces on to the enemy bombers. This enemy radar control station was later destroyed by cannon and machine gun fire from low level.

Weather considerations during the period of the exercise were very changeable. The main problem was to decide on landing conditions at home bases on the return of the bombers in the early morning hours. It was realized before the bombers were despatched that it might be necessary to divert them, on completion of their mission, to airfields in the Western half of the country. However, despite adverse weather conditions "Southland" bombers claimed a number of successful missions.

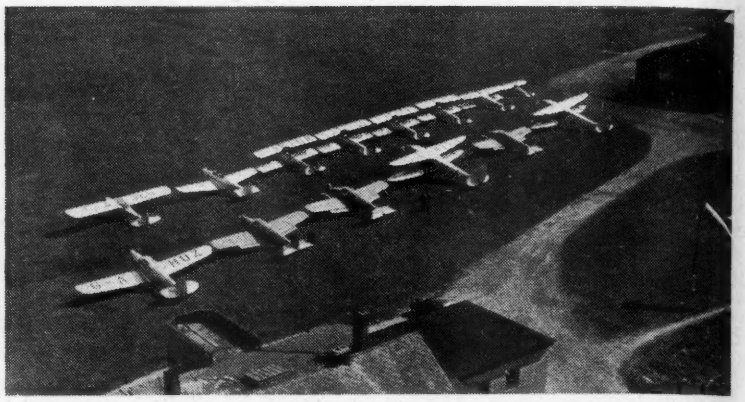
HERE AND THERE

Fairey Party

MEMORIES of last year's excellent affair, and perhaps the added attraction of swordfish on the menu, helped to bring together a very large and cheerful gathering for the Fairey Aviation Company's annual cocktail party. This year it was appropriately held at Londonderry House following the S.B.A.C. technicians' day on Friday, September 10th. It seemed, in fact, as though there had been a mass transposition of representatives of the aircraft industry, the designers, test pilots and many foreign guests from Farnborough to Park Lane, and the Aviation Centre was filled to capacity. Most people were sorry that there was to be no Royal Aeronautical Society Garden Party to round off the S.B.A.C. week this year, and Fairey's highly successful party generously provided an alternative social occasion which the guests thoroughly enjoyed.

Anglo-U.S. Team Work

IT was announced on September 12th that Firth-Vickers Stainless Steels, Ltd., of Sheffield, have granted to the Lebanon Steel Company of Pennsylvania the exclusive rights in America for the manufacture under licence of special alloys for gas-turbine engines. The two companies have arranged for the exchange of the latest technical data on corrosion- and heat-resisting steels. The president of the American company has described this as an extension of the teamwork which established air supremacy during the war.



BROXBOURNE FLEET: The Herts and Essex Aero Club's fleet lined up at Broxbourne Aerodrome. The Geminis and Messenger belong to members, and the photograph was taken from a club Auster.

U.S.A.F. Back at Bushey Park

ACCOMMODATION has been provided at Transport Command H.Q., Bushey Park, Middlesex, for the administrative staff of the U.S. Third Air Division. The staff, consisting of about 30 men, will be headed by Maj-Gen. L. W. Johnson, Commander of the American forces in Britain, and all operations of the U.S. aircraft stationed in East Anglia will be directed from Bushey Park.

Meteors in Denmark

EIGHT Meteor 4s, led by G/C. D. C. Lewis, D.F.C., were due to leave Horsham St. Faith to-day for Lubeck where they will spend the night before flying on to Kastrup Airport, Denmark. To mark the opening of the British Exhibition in Copenhagen on Saturday, September 18th, the Meteors will fly over the city in formation and also give aerobatic displays on the two following days. The aerobatic team consists of S/L. Wootten, F/L. Windle, and Capt. Tucker. A party of ground staff personnel will fly direct in two Halifaxes.

BEAUS FOR DOMINICA: The Dominican Republic recently sent representatives to Filton to accept delivery of a number of Beaufighters ordered through Vickers-Armstrongs. Here the Dominican Naval Attache, Captain O. de Windt Lavandier, is signing acceptance papers watched by (left to right) Mr. C. S. Cowles (B.A.C. assistant sales manager), Dr. C. S. Diaz (Dominican Legation), Mr. E. P. Mills (B.A.C. sales), Mr. A. Dymmot (Vickers), Mr. W. A. Cheesewright (B.A.C. deputy service manager), Major I. F. Crawford (Vickers) and Mr. Abrahams and Captain Sandforth (both of Airwork Ltd.) who handled the delivery flight.

Tribute to British Metallurgy

IN a letter written by Charles C. Misfeldt which is printed in *Aero Digest*, August issue, a striking tribute was paid to British gas turbine engines. Mr. Misfeldt was commenting on an article in the same periodical, published in April, by Lt. Eddy, U.S. Navy retired, about English jet engines. Mr. Misfeldt remarked that the life of the English gas turbines is greatly superior to the life of those produced in America and went on to say that he had seen numerous British engines stripped for overhaul after 800 and 1,000 hours' running. These, he said, were overhauled with no more work than is required for a 1,000-hour overhaul of American piston engines, whereas American gas turbines were overhauled at 50 hours and, according to the writer, "a great many do not last that long before trouble develops." The greater reliability of British gas turbines is attributed by Mr. Misfeldt to superior materials and research.

Smuggling of Ex-R.A.F. Aircraft

SCOTLAND YARD is investigating, with the help of the International Police Commission in Paris, the disappearance of Beaufighters which were recently purchased "for film work" by a company called the Airpilot Film Company, Ltd., which, it is now found, is not known either at its registered or London addresses. A price of £15,000 was paid for the aircraft, which were flown from Ringway and St. Athan to Thame, using special delivery flight permits since the aircraft had no C. of A.s. After a certain amount of film work had been completed at Haddenham airfield, Thame, the four aircraft left ostensibly for Exeter, but did not land there. Reports from Paris indicate that the aircraft may have landed in Southern France and subsequently taken off again for the Middle East. Another aircraft which has been missing for over a month is a Mosquito purchased from G/C. Cheshire, who had bought it and was unable to get a C. of A. for it. The M.C.A. have taken precautions to prevent recurrence of such disappearances.

Nicholson-Greig Memorial Service

A JOINT Memorial Service for the late Christopher David George Nicholson, M.A., F.R.I.B.A., and the late Donald Findlay Greig, A.F.C., who lost

HERE AND THERE

their lives whilst competing in the International Gliding Competitions in Switzerland last July, will be held at Christ Church, Down Street, London, W.1, at 12 noon on Friday, September 24th.

Altitude Record Confirmed

THE F.A.I. has informed the Royal Aero Club that the altitude record set up by Mr. John Cunningham, flying the Ghost-Vampire on March 23rd, has now received official confirmation. The height attained by the Vampire was 18,119 metres or 59,446 feet. The record flight was reported in *Flight*, April 1st.

Air Travel Facility

B.S.A.A. in conjunction with B.O.A.C. have introduced booking arrangements on the Miami-London and London-New York services which enable passengers to fly from London to New York by B.O.A.C. and return from Miami to London by B.S.A.A. and vice versa. The fare for the round trip is £171 15s. The company have also been granted permission to carry freight on their Lisbon-Azores service, which operates once weekly in each direction, until such time as a Portuguese air service is introduced.

Ex-Pathfinders' Ties

FOR those who may have observed a new tie coloured maroon with R.A.F. Eagles embroidered on it and wondered about its history, we learn that it is the new version of the Pathfinder Association tie. The more familiar Pathfinder tie with eagles on a navy-blue background is confined to those who were awarded the Pathfinder badges; and the appearance of the new tie, for which, incidentally, the Association has been inundated with orders, is in order to eradicate the dissatisfaction of some members who desired a Pathfinder tie although not awarded the badge.

General Aircraft Freighters

THE principal project on the aircraft side of General Aircraft, Ltd., is the contract for prototype Freighters now in hand for the Ministry of Supply. Work on these is well under way and should be completed next year. The hoped-for production contract has not yet materialized, but the firm are naturally anxious to secure a continuation contract since delay in reaching a decision may cause a serious gap between the completion of the prototypes and the commencement of work on a production order.

Victor Ludorum

AN astonishing recovery has been made by F/O. D. Knight at the R.A.F. Station, Leuchars; F/O. Knight was a victim of infantile paralysis which, according to medical opinion would deprive him of the use of his right shoulder and arm. After extensive treatment his arm was given up as useless and he was offered his discharge from the R.A.F. or transfer from his job as flying instructor to clerical work. He chose to remain in the R.A.F. and for over a year undertook remedial exercises on his own to such effect that in the recent station sports he won the putting the shot, throwing the hammer, throwing the cricket ball, discus and javelin—all with his right arm. He was specially congratulated by A.V.-M. D. V. Carnegie, who watched his performance.

OPERATION JERICHO: A.V-M. Sir Basil Embry, who directed the raid on the prison at Amiens which resulted in the escape of Frenchmen under the death sentence for underground activities, is here seen explaining how the original raid was carried out. A film of this raid, "Behind These Walls," is now being shown in London, at the Berkeley Cinema, Tottenham Court Road.

Cleveland Air Races

FOLLOWING his attempt to set up a new world speed record in the Cleveland National Air Races in America, which was foiled by the failure of the timing cameras to record some of the runs, Major Richard Johnson was forced to abandon his second attempt on September 6th by bad weather conditions. On the following day, September 7th, a commercial airline pilot, Anson Johnson, won the Thompson Trophy race and a prize of $16,000 in a Mustang at a speed of 383 m.p.h., 12 m.p.h. slower than the speed at which the race was won last year.

Miles Maintenance

HANDLEY PAGE (READING), LTD., are providing full facilities for the servicing, overhauling and renewal of C. of A.s of Miles Messenger, Gemini and Aerovan aircraft. Supplies of spares are also available to owners and operators and all enquiries should be sent to the Sales Department of the company, The Aerodrome, Woodley, Bucks; the telephone number is Reading 60811.

News in Brief

Bell Aircraft helicopter division has announced that de Havilland Aircraft, Canada, has been appointed to sell and service Bell helicopters in that country.

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During the St. Leger race-meeting at Doncaster complaints were lodged by the Doncaster Race Committee against low-flying R.A.F. aircraft which are said to have alarmed the horses.

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Brig.-General de la Colina, the Argentine Minister for Air, and the C.-in-C. of the Argentine Air Force, Brigadier Muratorio, arrived in London from Paris recently for a three weeks' visit to British aircraft establishments.

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It has been estimated by *United Nations World* that the present strength of Russian air power totals between 8,000 and 16,000 aircraft in the Soviet Army and 7,500 first line aircraft in the Soviet Air Force.

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Plans for an extensive migration service to Australia are being made by Australian National Airways who hope to start the service with 12 trips a month and increase it to 20. Skymasters are to be used between Paris and Sydney, and it is hoped to convey 600 migrants a month on this service.

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W/C. Frank Instone, a director of S. Instone and Co., Ltd., has been awarded the Order of Officer of the Crown of Belgium for the part he played in the liberation of Belgium.

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Silvoflex pipes manufactured by the Palmer Tyre Co., Ltd., were used on the de Havilland Goblin on its recent test run, and these required no attention throughout the trials, finishing in excellent condition.

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Docker Brothers, formerly at 177, Corporation Street, Birmingham 4, and Guildhall Buildings, Navigation Street, Birmingham, 2, have now moved into their permanent premises, the rebuilt offices of their factory at Rotton Park Street.

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The Hawker Siddeley group has purchased the factory owned by the Canadian Government at Malton, Ontario. The factory is at present leased by A. V. Roe, Ltd., Canada, from the government. No formal agreement has yet been signed and the purchase price has not been divulged. This plant built Lancasters during the war.

MACH I PLUS

John Derry's Wonderful Achievement in the de Havilland 108

Britain's supersonic combination—the D.H. 108 high-speed research aircraft and John Derry. Though some time is likely to pass before a British piloted aircraft exceeds the speed of sound under its own power in sustained level flight, we are at last tangibly reducing America's lead in ultra-high-speed flying.

ONE of the most efficacious tonics administered to British aviation in recent years is the news that Mr. John Derry, de Havilland test pilot, has exceeded the speed of sound in a D.H.108 research aircraft. *Flight* adds its congratulations to the many received by Derry and his company, at the same time acknowledging the part played by the Ministry of Supply in sponsoring the construction of a machine which now takes its place in aeronautical history as the first British aircraft to exceed a Mach Number greater than unity. It is gratifying, moreover, to record a pronouncement by a spokesman of the U.S. Army Air Force, who described Derry's achievement as "most important," adding that, although the Bell XS-1 had flown much faster than sound many times in controlled flight, the de Havilland machine more nearly approached a conventional and practical aircraft. (In all fairness the veracity of this statement must be questioned, for the Bell, although utilizing an unconventional power plant, namely, a battery of liquid fuel rockets, has straight wings, whereas the 108 has a swept-back wing and is further unconventional in having no tailplane or elevator.)

In conversation with Derry last week at the Ministry of Supply, it was learned that the historic flight took place at about 10 a.m. on the clear morning of Monday, Septemer 6th, between Farnborough and Windsor. Derry had no firm intention of attempting to exceed Mach 1, the declared purpose of his flight being the collection of data at speeds above Mach 0.96, which he had already attained. He put the 108 into a dive at 40,000ft, steepening the angle of descent as the hand of the Machmeter approached the magical figure "1" and holding the dive until the needle passed the limit of its indication. The outside air temperature was −30 to −35 deg C. Confident that he had exceeded the speed of sound (the A.S.I. was reading 400 m.p.h., equivalent to nearly 700 m.p.h. true air speed), Derry pulled out and headed for Hatfield. He had experienced no unusual sensations, but as speed built up the controls became very heavy, despite the power-boost system now installed. As the 108 decelerated to Mach 0.96 control characteristics returned to normal. No buffeting was experienced and no instability, excepting that which may heve been manifested in the tightening-up of the controls.

It was made clear at the Ministry of Supply that the phrase "apparent Mach Number" used in a preliminary communiqué implies no doubt of success, for the Machmeter was calibrated before and after Derry's flight.

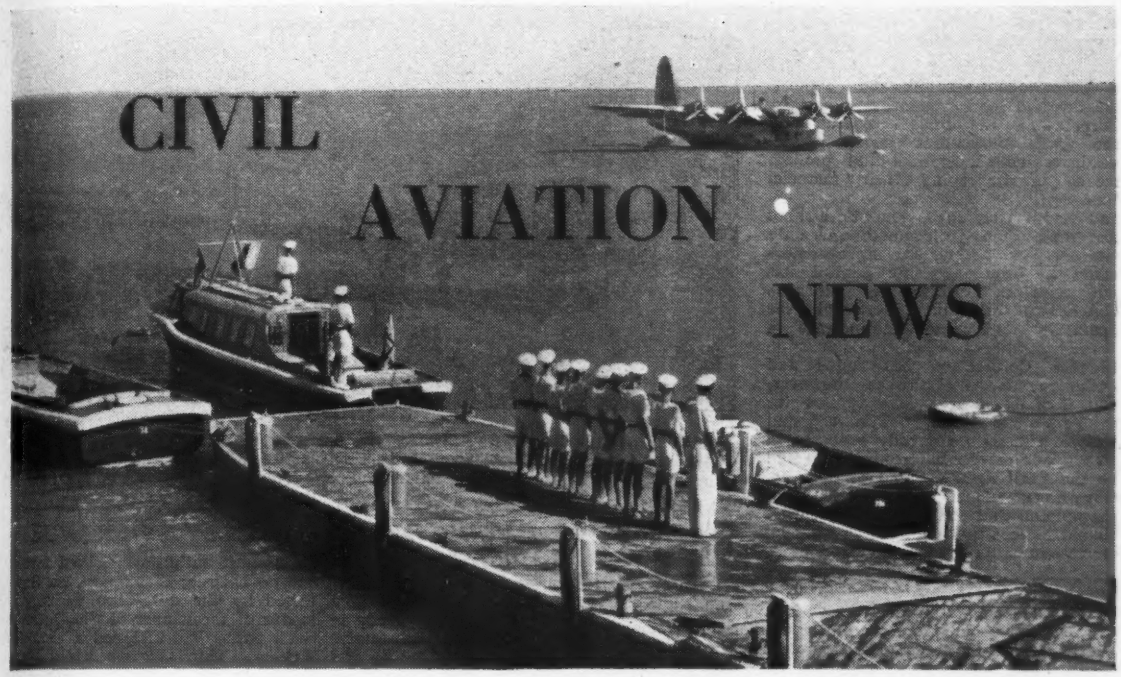
As the man primarily responsible for the design of the 108, Mr. R. M. Clarkson considers the next step in the M. of S/D.H. high-speed development programme to be consolidation of what is already known. The airframe of the 108 was not designed to withstand the loads of supersonic flight in the dense air at low altitudes, nor is it proposed to install a Ghost turbojet in place of the specially rated Goblin, for, though this might permit Mach Numbers above 1 to be achieved in level flight, very extensive modifications would be entailed. That the 108 is capable of higher Mach Numbers is almost certain, but whether these could be achieved with the machine under full control will not be known until further checks have been made.

The supersonic 108 is "VW120," the machine in which Derry this year captured the 100-kilometres closed-circuit record with a speed of 605.23 m.p.h. and in which, on the same occasion, he recorded straight-and-level speeds of the order of 640 m.p.h. The third of its kind, it differs from the second prototype, which broke up in the air, in having certain structural modifications of a comparatively minor nature, a stronger and cleaner cockpit enclosure, a more pointed nose, ejector seat, power controls and a Goblin turbojet of higher rating.

R.A.F.A. REUNION FESTIVAL

THE Royal Air Force Association's annual Festival of Reunion, held on Sunday at the Albert Hall, passed off in spirited style, due in great measure to the able production of S/L. Ralph Reader, M.B.E. (of "Gang Show" fame). The R.A.F. in past and present days was represented by members of the 650 branches of the Association, serving airmen and airwomen and Halton apprentices. Appropriately, music was provided by the Central Band of the R.A.F., under the Director of Music, S/L. A. E. Sims.

Items reminiscing on old wartime and pre-war days appealed greatly to the thousands of ex-members of the R.A.F. and their families present, and the professional artistes appearing were deservedly well received. The Festival was concluded by a service conducted by the Chaplain-in-Chief of the R.A.F., the Rev. J. A. Jagoe.



UNDER THE HAMMER: Days of service with B.O.A.C. are numbered for the Hythe flying-boats, one of which is here seen anchored at Korangi Creek, Karachi. Several have already been sold. Three services a week between Southampton and Sydney will continue until Constellations are introduced on the Australia route by B.O.A.C. One flight a week is at present made as far as Karachi only. The Short Plymouth class will, of course, continue on the Far East routes.

Amphibians for B.W.I.A. : British Aircraft in Central Africa : Irish Airlines' High Load Factor

I.A.T.A. MEETING AT BRUSSELS

SPEAKING at the fourth annual general meeting of I.A.T.A. which opened in Brussels on September 14th, Sir William P. Hildred, Director-General, reviewed the progress of aviation in 1947. During the year, he said, there had been a tendency towards rising costs and dwindling revenues, and if governments continued to insist on airlines paying increasing shares of airport and ground costs without helping to increase their profits, airline operations would be reduced to an unprofitable and sorry conclusion. Some progress had been made, he said, in the elimination of border formalities, but the position was still far from ideal. There were also too many cases of interference from governments.

Dealing with air traffic during the year, Sir William said that I.A.T.A.'s members' route network of 500,000 miles and aircraft fleet of 2,000 showed little change from the preceding year, but services had been intensified and improved, with the emphasis on increased frequencies and larger and more comfortable aircraft rather than on extensions to routes. The 1947 international safety record was also much the same as in previous years. While the load factor had declined, the number of revenue ton miles flown increased by 67 per cent over the 1946 level, and Sir William predicted that international airlines would probably fly about 5 billion passenger miles in 1948 and increase gross revenues by 50 per cent.

Continuing, the Director-General said that although the aviation industry as a whole was relatively small, its political importance was tremendous. He went on to point out that there existed an enormous passenger market for air travel as yet untapped owing to the present high rate structure, and gave it as his view that airlines might profitably consider the establishment of different grades of service, luxury as well as austerity. He also urged vigorous action to develop second-class international air service at lower rates as a step towards successful airline operation.

In conclusion, Sir William expressed the airlines' appreciation of the new Recommendations for facilitation of international air transport drafted by I.C.A.O., which, he said, although not entirely ideal, would still be flexible enough to suit their purpose. He also chose at random a few points from last year's work of I.C.A.O., many of which had the effect of increasing operators' costs.

SEALANDS FOR WEST INDIES

BRITISH WEST INDIAN AIRWAYS, a subsidiary of British South American Airways, has ordered three Short Sealand amphibian aircraft to fly on the "Sea Island Service" between Trinidad and the Windward and Leeward Islands. Hitherto some of these islands have been without any regular means of inter-communication, even by sea, and B.W.I.A. intend to provide, eventually, day return services from Trinidad to Tobago, Grenada, St. Vincent, Barbados, St. Lucia, Martinique, Dominica, Guadeloupe, Antigua and St. Kitts, with "request" stops at some of the smaller islands. Since some of the islands have no landing strips but excellent flying-boat harbours, an amphibian is the ideal aircraft. On water the Sealand requires a take-off distance of 550 yards, and on land 430 yards.

DAKOTAS FOR U.S. FEEDER SERVICES

MODIFICATIONS to the Douglas Dakota to make it suitable for internal feeder services in America are likely to keep this type in useful employment for some time to come. All-American Aviation Inc. have co-operated with the Douglas company to convert Dakotas from the normal 21 seaters to carry 24 passengers; they will also be fitted with "step down" doors and an extra cargo-loading door giving access to the luggage compartment at the rear of the fuselage. All-American Aviation will operate these feeder Dakotas over a system of routes connecting 45 cities, including New York, New Jersey, Pennsylvania, Delaware, Maryland, West Virginia, and Ohio. The decision to undertake this conversion was based on the desirability of spending a minimum of time on the ground and to keep as small as possible the number of ground personnel.

U.S. AIRLINE SUBSIDY

THE possibility of making large-scale loans to United States airlines is being examined by the U.S. government. It

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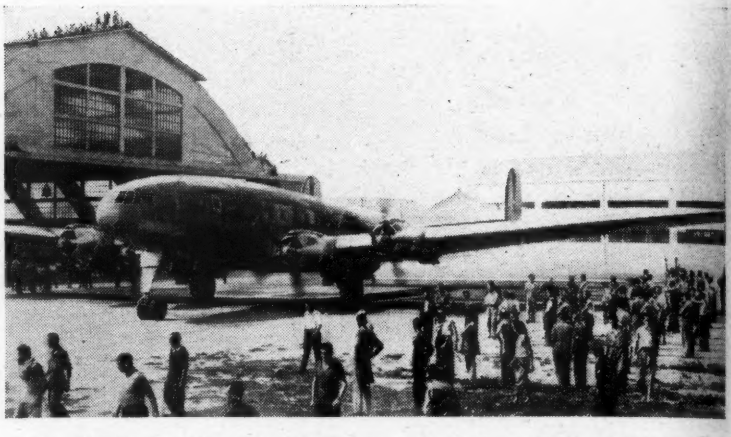
is understood that President Truman has directed the Reconstruction Finance Corporation, the Budget Bureau and the Civil Aeronautics Board to investigate airline finances and propose means of improving their financial condition. Between January 1st, 1946, and March 31st, 1948, domestic airlines lost more than £10,000,000, and only one company among the big operators made a profit. Private capital has not been made available, and the C.A.B. is reluctant to grant the operators' request for an increase in airmail payments. The Reconstruction Finance Corporation has funds and authority to help airlines, however, and T.W.A. has already applied for a £2,500,000 loan. T.W.A. and United Airlines are already proposing a 10 per cent increase in fares, which would be the third since the end of the war. Government officials are apparently of the opinion that the financial difficulties should be met by long-term governmental aid and not by an increase in either air mail payments or in passenger fares.



FOUR BRITISH ENGINES: First flight of the Breda Zappata BZ 308 was made from Milan on August 27th. This large transport weighs 18,100 lb all-up and is powered by four Bristol Centaurus. A maximum range of 3,100 miles is expected but the fuselage is not pressurized.

CENTRAL AFRICAN AIRWAYS SCHEDULES

MAIN feature of Central African Airways' summer schedules, which came into force on September 1st, is the introduction of the first scheduled air freight service to operate in South Africa. The aircraft on this run, Bristol Type 170s, will operate on Fridays from Salisbury and Lusaka, returning the following Wednesday, and on Saturdays from N'dola through Lusaka and Bulawayo to Johannesburg, returning to N'dola along the same route on the following day; freight services will also operate to Blantyre in Nyasaland, Fort Jameson and Kasama in Northern Rhodesia, and Abercorn, near Lake Tanganyika. The Bristol freighter is also available as a passenger aircraft, the bulkhead being moveable to accommodate 16, 24 or 32 passengers according to the freight carried.

In addition to the freight flights three services operate each way between Salisbury and Nairobi via Lusaka, N'dola and Tabora; five between Salisbury and Johannesburg through Bulawayo; one between N'dola and Johannesburg via Lusaka, Salisbury and Bulawayo; and three between Salisbury and Blantyre, Vikings being used on all these routes. The Salisbury-Nairobi services connect with flights from Johannesburg, and passengers on the Johannesburg-Nairobi route are provided with free overnight accommodation in Salisbury and a higher free baggage allowance of 66 lb. D.H. 89a Rapides operate from Salisbury to Bulawayo, Beira and Livingstone; from Livingstone to Bulawayo, Lusaka, and Balovale; from Blantyre to Fort Jameson and Beira; and from Lusaka to Mbeya. A service is also operated from Salisbury and N'dola to London with overnight stops at Uganda, Sudan and North Africa.

C.A.A., a non-subsidized public undertaking, has a route network of over 6,000 miles in Africa, and operates a fleet of 18 aircraft, all of which are British. Maintenance of these machines is carried out at the company's main base at Salisbury.

B.E.A. CONTINENTAL TRAFFIC

SUBSTANTIAL increases in passengers, freight and mail carried on B.E.A.'s Continental services are shown in figures published by the Corporation for July, 1948. During the month 23,628 passengers travelled on these routes, an increase of 7,650 over the same month in 1947, and also an increase of 4,143 over June of this year. Continental mail increased from 44,611 kgs in July, 1947, to 136,629 kgs during July, 1948, and freight, which in July last year totalled 92,949 kgs, this July totalled 301,953 kgs. On internal services during the month 53,691 passengers, 103,419 kgs of mail and 79,974 kgs of freight were carried, compared with 52,920 passengers, 59,122 kgs of mail and 80,223 kgs of freight handled in July last year. The total number of passenger stage flights on British and Continental services dropped from 10,963 in July, 1947, to 7,188 in July this year, the number of aircraft miles flown from 1,422,618 to 1,402,594, and route miles from 16,452 to 16,052. Revenue passenger miles, however, rose from 14,358,639 in July, 1947, to 19,007,174 in July this year.

MODEL AIRCRAFT RALLY IN FRANCE

LIGHT aircraft and model aircraft enthusiasts joined forces for a rally held in Flers de L'Orne, Normandy, on September 5, which was arranged by the Aéro-Club de Basse-Normandie, primarily in honour of the winner of the Queen's Cup for Model Aircraft, which award had included a visit to France provided by Her Majesty. Three Austers and a Messenger from England flew the winner, Mr. Phillip E. Smith, and M. L'Abbé Amiard, vice-president of the A.C.B.N., who had from London arranged for the excellent reception in France; members of the Northern Heights M.F.C., including Dr. and Mrs. Thurston, Mr. C. T. Buffery and Mr. E. A. Ross, also flew with the party. On the Saturday they were the guests of the Count de Bagneux at his Le Repas castle near Flers, while on the Sunday they were entertained by the Aéro-Club to lunch—a mere snack of five or six courses, including chicken cooked in cream.

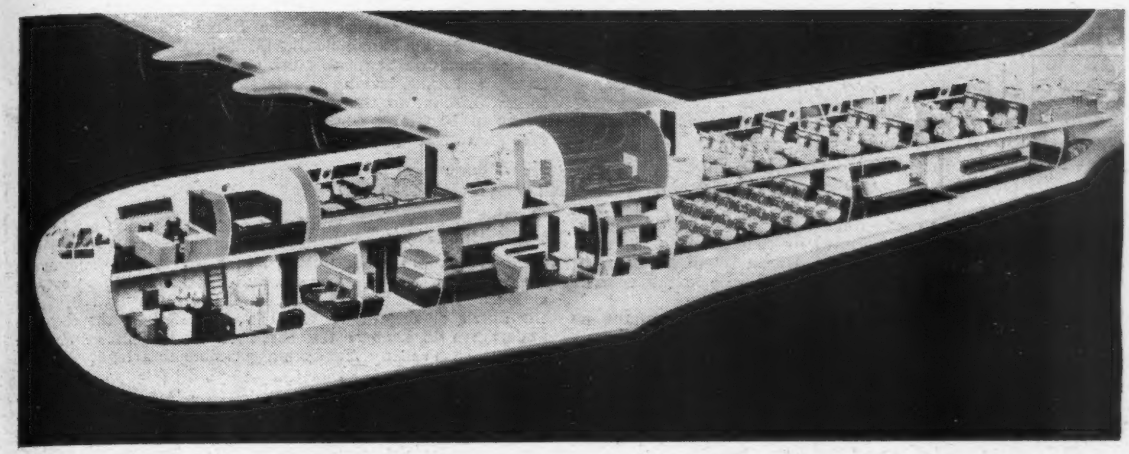
The business part of the rally commenced rather late after the lunch, and the light aircraft were kept busy with a flying programme, including glider-towing, repayment for the count's hospitality (and éclairs) being made by "beating up" his castle. On the model side the contests arranged were somewhat overshadowed by demonstration flights, outstanding among which was a display by C. T. Buffery of a Frog control line model with a 1.66 c.c. diesel engine; its aerobatics drew spontaneous applause from a large crowd. Philip Smith was also hard at work flying one of his own models with a Jetex power unit which aroused considerable interest among the onlookers.

While bad weather at times added adventure to the trip to and from Flers in the light aircraft (three up, luggage and models—and there was a little matter of a landing on the Deauville polo ground) it did little to interfere with the success of the rally; the hospitality of Father Amiard will be remembered for a long time by the English party.

AER LINGUS RECORDS

ACCORDING to the latest issue of I.C.A.O.'s *Statistical Summary*, Aer Lingus's international passenger figures in December last were only exceeded by two airline companies—K.L.M. and Pan American. During the first quarter of 1948 the number of passengers who crossed between Ireland and the U.K. increased very considerably compared with the same period in earlier years; the comparison shows an increase of 162 times the number of passengers who travelled by Aer Lingus in 1937. The month of August surpassed all previous records by the company and the passenger traffic figures exceeded those of August by 10 per cent. A total of 27,197 persons were carried during August, 1948, as against 20,968 in August, 1947. Of these 11,000 travelled on the London route and 8,600 on the Liverpool and Manchester services, an increase of 72 per cent on the latter routes.

The total of 3,546 passengers on the Glasgow service represents a 70 per cent increase over last August's figures and comparisons with July figures for the Isle of Man and Paris routes show increases of 42 per cent and 58 per cent respectively. During the last week-end of August 4,036 travelled on Aer Lingus aircraft and every machine was given optimum use:



CAMPAIGN AGAINST BOREDOM: Passengers in the SR.45 flying-boat will have ample opportunity of relieving boredom. This interior design has been created by Mr. Richard Lonsdale-Hands and his associate designers for Saunders-Roe Ltd. to provide accommodation for 100 passengers. There are two staircases, 20 sleeping berths, a cocktail lounge, promenade deck, powder rooms, and a fully equipped kitchen. The restaurant is decorated in a combination of light and dark fawn with deep green and maroon, and the main upper cabins are in a general pastel theme of grey and light fawn above head level and maroon and dark green below the lower lines of the port-holes. The seating and sleeping cabins are decorated in a number of themes and colours in harmony with a policy of variety.

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fourteen services to London were operated on Sunday, August 29th, and over the period the volume of outbound traffic carried represented a 98 per cent load factor.

FRENCH AIR FLEET

AN official return of the air fleet operating for Air France throughout the world in July, 1948, showed that the company owned 171 aircraft, composed as follows: 13 Lockheed Constellations and 14 Douglas DC-4 Skymasters based on Orly; 44 Languedoc 161s, of which 20 are based on Le Bourget, 9 in North Africa, 7 on point of delivery and 4 undergoing overhaul; 45 Douglas Dakotas, 9 are in Central Africa, 6 at Le Bourget, 13 in North Africa and Morocco, 5 at Marignane (Marseilles), 4 on the internal airmail system and the remainder at Beirut, Bordeaux, Middle East or in the repair shop: 26 Junkers 52s, used for the internal airmail service in France and for feeder lines in Madagascar; 17 Caudron 449s, used mainly for instructional work at the "Centre de Perfection de Pilotage et de Navigation" at Le Bourget; 3 de Havilland Dominies used for feeder services in Madagascar; 6 Latécoère 631s stationed at Biscarosse (Bordeaux); and 3 Catalinas used for the link between the Antilles and the mainland of South America.

BREVITIES

K.L.M. are to open a weekly service from New York to Shanghai via Amsterdam on September 28th. Constellations are be used on the route.

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Traffic at Gardermoen airport, Oslo, which is used by S.A.S. and A.O.A. for inter-continental traffic and by B.E.A. for their Oslo-London service, increased considerably during the month of June. The total number of passengers at the airport was 1,986, of whom 907 were incoming and 599 outgoing; 480 were passengers in transit.

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Passenger movements at Bromma Airport, Stockholm, during June and July this year showed little change over those for the corresponding months the previous year. In June, 1948, the airport handled 19,570 passengers as against 18,330 passengers the previous June, and in July, 1948, there were 20,619 passenger movements, as against 20,921 in July the previous year.

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The entire engine installation in the new de Havilland Drovers has been brought forward one foot. This permits the incorporation of all accessories forward of the fire-wall, thus facilitating maintenance work. The company has announced the sale of 16, of which six are for T.A.A., four for Q.E.A., two for D.C.A. to replace Ansons, two are for overseas delivery, and there are two prototypes which rank as government purchase. Production of 100 is planned.

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The first of K.L.M.'s 12 Convairs arrived at Schiphol airport on September 6th. These 40-seater aircraft are to be used on the airline's European routes, and the company are the first in Europe to use the type. Modifications have included the removal of the ramp. This first aircraft was commanded by a British pilot Commander Michie, and was met by Dr. A. Plesman, President-Director of K.L.M., and other officials.

Substantial reductions in fares and excess baggage charges are announced by B.S.A.A. On the London-Kingston route, for instance, the return fare has been reduced from £225 to £207 14s, on the London-Nassau route from £212 8s to £187 2s, and on the London-Bermuda route from £176 8s to £174 12s. The through return fare from London via Bermuda and Nassau to Miami is now £187 2s, as against £219 12s previously; and from London by the same route to Havana, the fare is £196 2s, as against £226 16s previously.

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Pan American World Airways has applied for permission to operate to Stuttgart, which would then serve as a stop between Frankfurt and Munich, to both of which cities the company already runs a service. Adequate airport facilities exist at Echterdingen military airport near Stuttgart, and it is understood that the proposal is favoured by the American military authorities as a move to ease the strain on U.S. Army transportation facilities. P.A.W.A. are prepared to start the new service immediately the application is approved.

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New premises acquired by B.E.A. in Glengall Street, Belfast, were formally opened on September 1st. Constructed of pre-cast concrete units suitably insulated on the interior, the new building contains both passenger and freight accommodation, the former including an entrance lobby, a left luggage office, and a spacious waiting lounge. The site is part of the Great Northern Railway's terminus, and all the facilities of the station are at the disposal of airline passengers.

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Figures showing marked increases in air travel between Britain and Northern Ireland were recently quoted by Mr. Gilbert Waters, general manager (British Services), B.E.A. During the year ended August 31st over 81,000 passengers were carried on the Belfast services, an increase of almost 100 per cent on the 1946 figures. There were also increases in the

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amount of freight carried, over 80,000lb having been transported in August this year, and the number of passengers carried to and from Belfast during the same month totalled 12,067, as against 7,800 in August, 1946.

A new direct service between Brazil and Switzerland has been opened by Panair do Brasil, using Constellations. The service began on September 6th and to start with will operate once a fortnight, leaving Rio de Janeiro and flying via Recife, Dakar, Lisbon, to the airport at Kloten, Zurich. The President of Panair do Brasil, Dr. Paolo Sampeio, flew on the first aircraft to operate this service.

FROM THE CLUBS

COWES Aero Club have pointed out that their longest runway is 1,280 yards long and therefore exceeds by 80 yards the new runway at the Lea Airport, Isle of Wight, referred to in *Flight*, August 26th, as the longest runway in the Island.

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MARSHALL'S Flying School at Cambridge completed a total of 252 hours during the months of July and August. In this time nineteen new members joined the club. A flying scholarship, awarded by the Managing Director, Mr. A. G. G. Marshall, to the most outstanding cadet of 104 (Cambridge) Squadron, A.T.C., was won by F/S. Bing, who has started his flying training and went solo after 7 hours 18 minutes' dual.

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IN his speech at the annual general meeting of the Yorkshire Gliding Club, Mr. A. M Verity, the chairman, commented upon the failure of the Government to assist or encourage gliding and soaring in Britain. In the absence of a direct subsidy, Mr. Verity said that it would greatly help to keep the cost of gliding and soaring down to a reasonable figure if the Government would assist with the cost of maintenance and repair of club aircraft and equipment. What Mr. Verity asked for was prompt action to supplement the assurances of a "desire to help" that had been given.

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THE final competition of the season at the Herts and Essex Aero Club will be held during the last week of this month and the first week of October. This will be to decide the club championship for the year and the Woodside Challenge Cup, presented in 1931 by the late W. Sanders will be awarded to the winner. The competition will include a general flying test, cross-country and aerobatics. During August the club put in 369 flying hours, which brings its total for 1948 up to 2,146. The annual dinner and dance has been arranged for December 15th and will be held at the Park Lane Hotel, London.

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COMPARATIVELY few flying hours were possible at the Yorkshire Aeroplane Club during August, due to extremely bad weather. However, the treasure hunt held on August 22nd was an outstanding success, and on August 28th several aircraft flew down to the Lympne Air Races, and three of these proceeded to Ostend for the International Rally there. The rates for the club's Proctor and Auster have been reduced to £7 per hour dual, £6 per hour solo, and £3 10s per hour dual and £3 per hour solo, respectively, as from September 1st. The club has a number of Auster Autocrats and Model D Austers for sale at prices from £450 to £1,275, and further details can be obtained from the Manager, Sherburn-in-Elmet.

ON September 17th the South Coast Flying Club are holding a dance, for which tickets purchased in advance cost 6s and those purchased on the night cost 7s 6d. This marks the beginning of the winter season. On the following evening a dance is being held at the Shoreham Town Hall in aid of the Battle of Britain week. The committee of the club has undertaken to support the R.A.F.A. at this dance and are anxious for as many members as possible to attend.

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SOME twenty members of the Derby Aero Club recently made a mass lunchtime invasion of Sywell and were most hospitably welcomed. Members have also paid visits to the Continent and the Channel Islands, in addition to trips to other clubs at home. Air Schools, Ltd., have presented a challenge trophy for competition between the Derby and Wolverhampton Aero Club, and on October 3rd the contest for this will take place at Derby. Points will be awarded on an aggregate basis for several diverse and ingenious aerial competitions.

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THE Hampshire Aeroplane Club instituted, in June, a scheme of instruction of up to 15 hours for £30. Conditions are that the sum will be paid in advance and will include full membership of the club for a year. Each lesson takes approximately 30 minutes and pupils are expected to make frequent attempts. After five hours' instruction each pupil is assessed by the C.F.I. and those considered to be unsuitable have £15 refunded to them. The average pupil takes 10-15 hours, and any pupil who is not qualified by the maximum laid down is asked to give up altogether or continue at normal club rates of £3 15s per hour. Tiger Moths are used and a trial lesson is given for £1. Flying kit and parachutes are provided. Since the scheme started 11 new members have qualified for "A" licences and eight others are under training. Further particulars may be obtained from the Secretary of the Club, Southampton Airport.

* * *

AT Cambridge airport the local V.R. Centre were fortunate with the weather for their "At Home" last month and, since the University Air Squadron were away at Shoreham at the time, challenges were sent to the V.R. Centres at Rochester and Sywell to enter the competitions. The first of these, a formation flying contest in Tiger Moths, was won by the home entrants by one point only, from Rochester. The next event was an obstacle race in which pilots had to don flying kit, crawl under a tarpaulin and sprint to their aircraft, the first to strap himself in and start the engine being the winner. F/O Gilbert, a local competitor, was well ahead but was disqualified for forgetting to pull on his gauntlets, leaving Rochester first and Sywell second. After a height-judging contest, won by two people, who were given free joy rides in a Rapide as the prize, Mr. Free, of the Cambridge University Gliding Club, gave a good display of aerobatics in an Olympia Sailplane, ending his performance with a well-judged landing close to the spectators' enclosure. The next event was a slow flying race for three Tigers flown by R.F.S. instructors. Cambridge took first and third places in the aerial treasure hunt, with Rochester second. Civilian members of the Cambridge Aero Club came first and second in the spot landing contest, with the Cambridge R.A.F.V.R. third. The winner of this competition demonstrated great presence of mind when, after touching down and realizing he would overshoot, he opened the doors of his Auster to create the necessary drag to stop quickly; the use of brakes would, of course, have meant disqualification. The day's flying was rounded off by an informal dance in the V.R. Club at the airfield

LUSCOMBE'S LATEST: A photograph of the first production model of the 1949 Silvaire Sedan which has successfully completed production flight tests. This aircraft, built by the Luscombe Aircraft Corporation, is of all-metal construction and is powered by a 165 h.p. Continental engine. The Sedan has a cruising speed of 130 m.p.h. and a top speed of over 140 m.p.h., the rate of climb is 900ft per minute, and the service ceiling 17,000ft. It costs $6,995.

The S.B.A.C. Display

Full Report from Farnborough : Some 40 New Aircraft : Excellent Progress in Gas Turbine Development

Illustrated by "Flight" photographs and sketches.

"IF anyone should say that, because of the lengthy gestation of a new aircraft and aero engine, an annual show is too frequent, the Society of British Aircraft Constructors has certainly confounded such an argument this year. No one would venture to say that there are not sufficient new wares on display this afternoon—indeed, there are nearly 40 aircraft of all types which have not been seen before at an S.B.A.C. show."

Those words, spoken by the Minister of Supply, Mr. G. R. Strauss, M.P., at the official opening luncheon at Farnborough, will be echoed by everyone who had the good fortune to attend last week's display and exhibition. There has been so much criticism, most of it unjustified, of the British aircraft industry that many began to think there must be some basis for it. Farnborough gave an effective and convincing answer. The show was truly magnificent, and there can be few of the 2,000 or so special guests from overseas who are not going back to their own countries with a firm conviction that Great Britain is still in the forefront where aviation material or every kind is concerned.

The effects of the S.B.A.C. show are not easy to assess, but there is no doubt that last year's show at Radlett helped very materially in bringing the export figure up to nearly £24,000,000. This year promises even better, and how thoroughly the S.B.A.C. had "covered the world" in its invitations is shown by the fact that no fewer than 69 countries were represented, a far greater number than at any previous event of this kind. Altogether some 10,000 invitations to see the display were accepted, and there were probably few, judging from the huge attendance, who failed to turn up. The number of different tongues heard at Farnborough was quite remarkable, many of them unrecognisable to British ears. The organisers could not possibly cater linguistically for them all, but by broadcasting the commentaries in French and Spanish as well as in English there were probably few who could not follow the announcements in one language or other.

On the whole, the organization was excellent, and every interest was catered for by having flying demonstrations in the afternoons of the first three days, with a "grounded" day on the Friday, when technicians and engineers from the industry and from Government departments had an opportunity to study the exhibits closely and at leisure. The general public turned up by the thousands on the Saturday and Sunday afternoon, when the same flying demonstrations were given as during the "trade days." Sunday morning had very properly been set aside for the personnel of the Royal Aircraft Establishment itself.

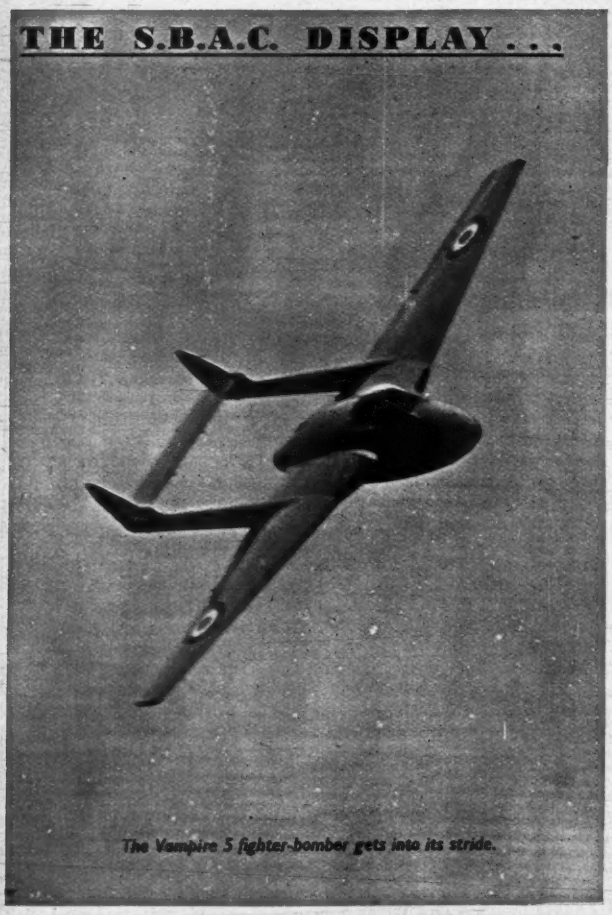
On the following pages are given illustrated reports and impressions of the exhibits and flying displays, from which those of our readers who were unable to visit Farnborough will be able to form an opinion of the very high standards achieved by the British aircraft industry in its ninth exhibition.

WELCOMING THE GUESTS: *Sir Roy Dobson, president of the S.B.A.C., speaking at the official luncheon at Farnborough. On his right are Sir Frank Spriggs, managing director of the Hawker Siddeley group, and Mr. G. R. Strauss, Minister of Supply. On his left can be seen Mr. A. Henderson, Secretary of State for Air, Mr. W. R. Verdon Smith, vice-president of the Society, and Mr. G. Lindgren, Parliamentary Secretary, Ministry of Civil Aviation. On the left, in the foreground, is Mr. E. C. Bowyer, director of S.B.A.C., who is seated next to Capt. Vroonen of the Belgian Air Ministry.*

The skilfully designed Short Sturgeon T.T.2 target-tower.

Another Naval target-tower—the Mosquito T.T.39, very ably adapted by General Aircraft.

THE S.B.A.C. DISPLAY . . .



The Vampire 5 fighter-bomber gets into its stride.

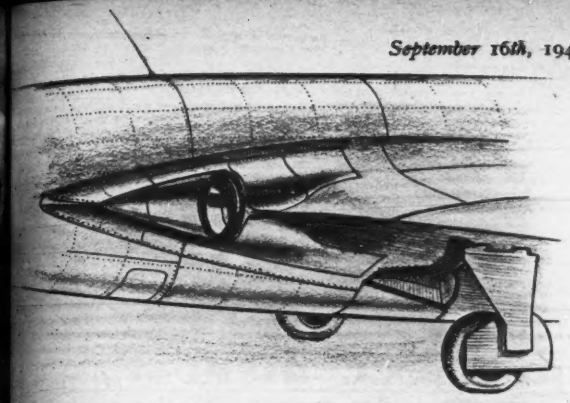
MILITARY AIRCRAFT NOTES

IN the absence of Britain's first jet-propelled bomber, the designation of which may not yet be disclosed, and of the Avro Shackleton G.R.1 long-range maritime reconnaissance aircraft, interest in the military machines was concentrated on new fighters and trainers. The former were notable for structural and aerodynamic advances and for their power plant and tankage installations, rather than any discernible features of solely military significance. Unfortunately, Hawkers were prevented from disclosing intimate internal particulars of the N.7/46 Naval fighter, or of the land-based P.1040, which, being of such novel layout, tended to steal the show from their more familiar, though nevertheless excellent, rivals. It does appear, however, that the internal fuel in the N.7 is carried in three main tanks—one directly behind the pilot's ejector seat, a second over the turbine and main jet pipe of the Nene, and a third between the twin outlets. A drawing suggests that overload fuel is to be carried in two under-wing drop tanks mounted close inboard, but there is a strong likelihood that the N.7 may eventually sprout two 90-gallon wing-tip tanks similar to those of the American Thunderjet. Whichever method is adopted, the makers seem confident that their new Naval fighter is potentially capable of covering distances of the order of 2,000 miles. Further improvement in performance would logically involve the sweeping back of the wing and tail surfaces, and the existence of a similar machine, so developed, has been unofficially disclosed. No particulars of this design (designated E.38/46) were, however, forthcoming.

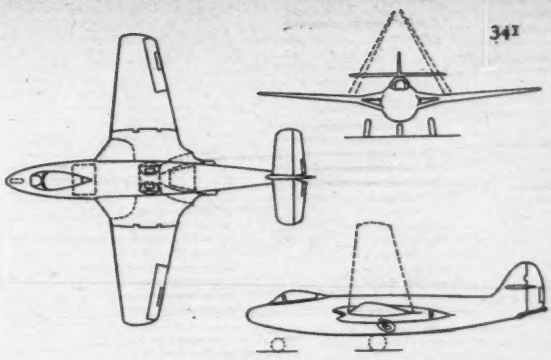
Though the N.7/46 and P.1040 are essentially similar, dimensions of control surfaces and other details appear to differ. The Naval machine did not fly on the first day, but was busily engaged in demonstrating its power-folded wings. The neat stowage of the sting-type arrester hook and the provision for a single-hook catapulting gear were other features which repaid study.

Comparable with the N.7/46 in having a single Rolls-Royce Nene, the squat Gloster E.1/44 (shown in model form with high-set tailplane *à la* Meteor) is being utilized as a research aircraft with some 500 strain gauges for plotting pressures or measuring loads on its thin, square-cut

Comparative views of the Boulton Paul Balliol T.1 (Mamba) and T.2 (Merlin). Note the new dorsal fin.



Jet outlet and fillet details of the Hawker N.7/46.



General arrangement of the N.7/46 Naval fighter.

wing, the place normally occupied by the cannon magazines having been given up to an electrical recording unit. The absence of the E.1/44 left a regrettable gap in the programme.

Another notable absentee was the Supermarine Attacker. Details of this highly developed land- or carrier-based Nene-powered fighter are, however, generally known, and it was hoped (in vain, alas) that preliminary particulars of a development, with swept-back wing and tail surfaces, might be released. There is no apparent reason why a de Havilland Ghost turbojet should not be installed in aircraft of the Attacker family as an alternative to the Rolls-Royce Nene.

Though reference to the specialized fighter-bomber Mark 5 Vampire has already been made in *Flight*, this interesting new variant made its first public appearance. Externally it resembles the Mk 3, but has square-cut wing tips of 38ft span (the Mk 3 measures 40ft) and is strengthened locally to handle heavy alternative loads of R.P.s or bombs. The power unit is the Goblin 2 of 3,000 lb static thrust. Representative external loads were disposed on the tarmac beneath the wings of this compact-looking ground-attack fighter, the amputated extremities of which contrasted sharply with the extended, pointed, wings of the special Ghost-Vampire which, with Mr. John Cunningham under its special metallic canopy, attained the world's record height of 59,492ft. On that historic occasion, of course, "TG 278" was stripped of paint, but this deficiency was generously rectified before the display by the application of an extremely handsome glossy cream finish, relieved by exquisite gold and black markings. It is comforting to know that in the Ghost-Vampire research aircraft (fitted, incidentally, with a specially rated Ghost "development" unit) we have a potential high-altitude interceptor capable of dealing with any specialized bombers which might be employed against this country, as were the Ju 86Ps during the late war. To help counter that menace, it may be recalled, de Havillands extended the wings of a special pressurized Mosquito.

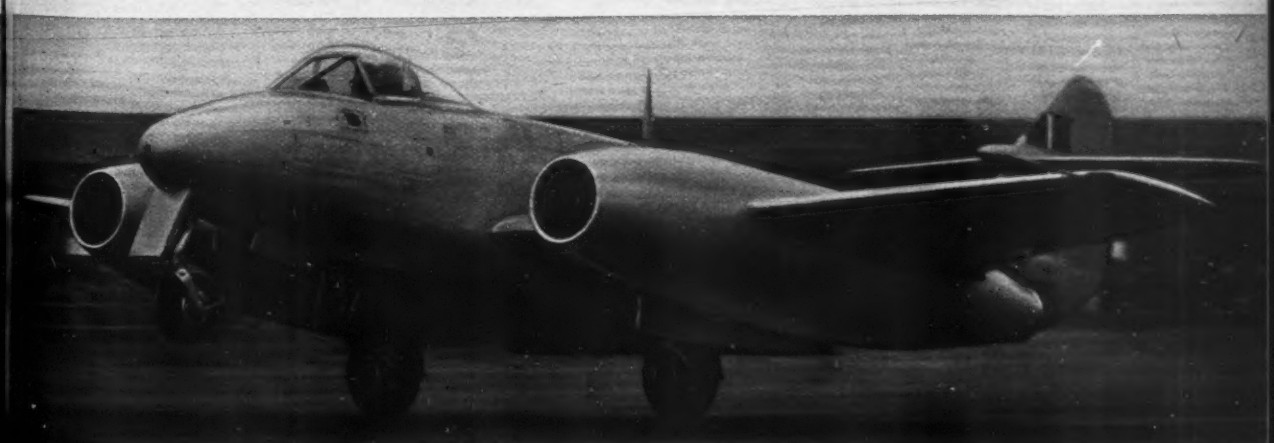
Though the so-called "long-nosed Meteor 4," with additional fuselage tankage, was publicized at Radlett in 1947, the Meteor fighter on display this year was a perfectly standard machine from the Mark 4 production line. (It appears that the version with the lengthened fuselage is to be allocated a new Mark number—possibly Mk 8—in which case it becomes subject to security restrictions!) From the technical standpoint greater interest attached to the Meteor 4, powered with Metropolitan-Vickers Beryl axial-flow turbojets in lengthened underslung nacelles, basically of cylindrical form. With the increased thrust of the Beryls (7,700 lb total, against the 7,000 lb delivered by the standard Derwent 5s) and with its very clean airframe (the gun ports were faired over) the Metrovick-Meteor is proving very fast indeed. Structurally the Beryl-Meteor differs from the standard Mk 4 in the main spar arrangement, the characteristic "banjo" having given place to an inverted "U" section. The makers point out that information obtained with this machine should prove a valuable guide to high-speed applications of the Beryl in future aircraft. It is interesting to recall that a modified prototype of the Meteor, equipped with the forerunner of the Beryl, was the first aircraft with axial-flow turbojets to fly in this country. With two F.2/1 units, this historic machine—to specification F.9/40—first flew at Farnborough in 1943—not, be it said, in public.

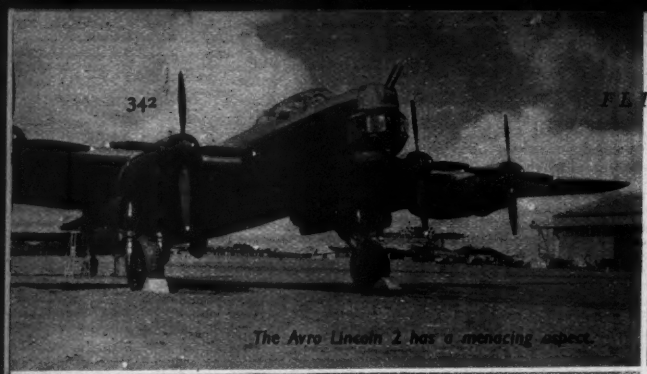
Once again the sole representative in the heavy bomber category was an Avro Lincoln 2, fully armed with its 0.5in and 20 mm guns. Though there are many faster and more modern bombers now flying overseas, the Lincoln has so much in common with the Lancaster and is so greatly superior in performance and armament, that for years to come it will stand proud among any assemblage of military aircraft. Nevertheless, some sleeker and lower Avro bomber would make a welcome sight in its company.

The Bristol Brigand appeared in its "B.1" bomber form, with full panoply, including two 1,000-lb bombs under the fuselage and two 500-pounders beneath the wings. The fuselage bombs are stowed on the centre line, the forward one being well towards the nose, in the region of the cannon muzzles; those under the wings are suspended from faired carriers, approximately of aerofoil section. Though the Brigand carried its full complement of fixed guns (4 × 20 mm) the dorsal-mounted 0.5in Browning was not in evidence.

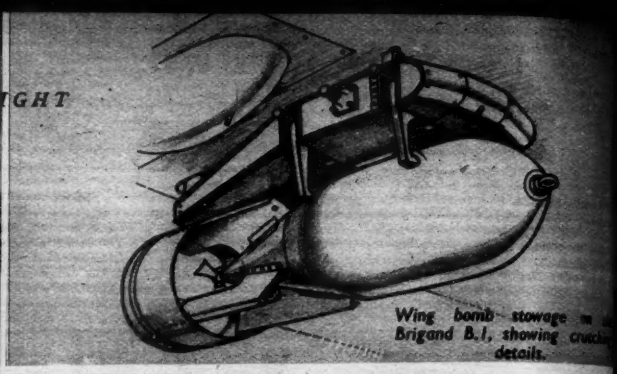
A model on the Martin-Baker stand depicted a proposal for a turbojet fighter of Delta plan form, with the pilot

Landing after a very-high-speed demonstration, the Beryl-Meteor shows its nacelle form.





The Avro Lincoln 2 has a menacing aspect.



Wing bomb stowage in the Brigand B.1, showing crucial details.

THE S.B.A.C. DISPLAY . . .

Another business-like bomber—the Bristol Brigand B.1

seated in the leading edge of the fin. An Avon, or some unit of similar output and configuration, would appear to be suitable for this bold design.

The only examples of Naval strike aircraft—both Blackburn's—were the Firebrand 5 (no specially furbished show exhibit this, but a work-stained Service machine, complete with blue-nosed torpedo) and the S.28/43, looking very purposeful with its close-cowled methanol-injected Centaurus, cranked wing (with less dihedral than last year) and ample fin and rudder area, for docile carrier landings. Having power-operated ailerons, the "S.28" possesses a remarkable rate of roll. Blackburns were exhibiting a photograph showing a portion of what appeared to be a mock-up of a new machine with unusually shaped nose, such as might house coupled turboprops—a power-plant installation which should lend itself particularly well to Naval requirements. Could this photograph, it was asked, portend a new Naval type for Farnborough, 1949?

Though the astonishingly adaptable Fairey Firefly 5 is not generally categorized as a strike aircraft, its potentialities in this direction were exemplified by the array of bombs, R.P.s, cluster containers and cannon ammunition assembly beneath the wings, in addition to overload tanks, A.T.O. rockets and depth charges. It was announced that carrier trials have now been completed with the new power-folding wings, to be standardized on all future Mark 5 Fireflies.

Deep were the regrets that Westlands were unable to show a Wyvern torpedo-fighter. It is to be hoped that their fine work on this type may soon be followed by the announcement of a Naval order.

The manufacturers of our two new military transports—the Handley Page Hastings and Vickers-Armstrongs Valetta—had set out to exemplify the extreme versatility of these important machines. Appreciably shorter than the new civil Hermes IV, the Hastings nevertheless readily

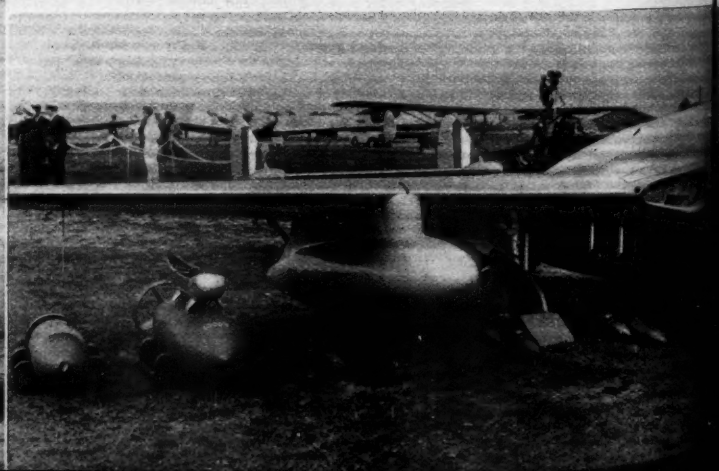
Remarkable in appearance and performance—the Supermarine Seagull.

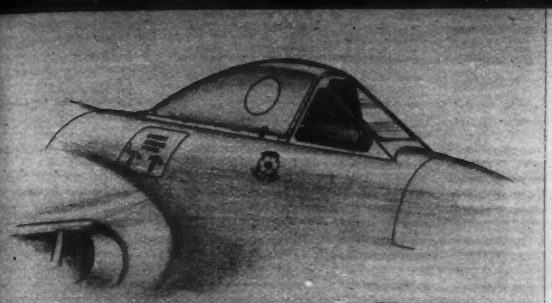
(Left) Mainplane and folding details of the Hawker N.7/46 Naval fighter.

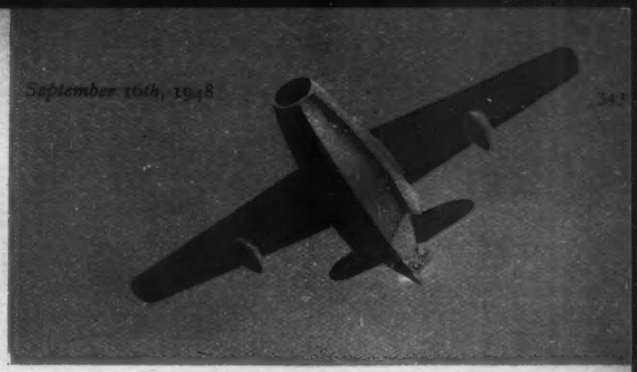
(Right) Possible plan-form of a Supermarine fighter (Attacker development).

(Below) Alternative external stores handled by the de Havilland Vampire 5 fighter-bomber.

(Lower right) Ghost-Vampire "TG 278," holder of the world's height record.







(Above) Canopy details of the high-altitude Ghost-Vampire. (Right) The S.R./A1 makes its début.

handles all the loads specified by the Army or R.A.F. (Service loads, in general, being more concentrated than those normally taken by civil aircraft). The Valetta had the new undercut tail section, with glider-towing hook, and contained examples of the amazingly varied equipment necessary to accommodate human and inanimate cargoes. Of particular interest was the quickly detachable sound-proofing supplied for the troop-carrier variant.

A splendid crop of military trainers was one of the most satisfactory features of this year's display. These ranged from the Auster 7 light A.O.P. trainer, by way of the *ab initio* Fairey Primer and the de Havilland Chipmunk, to the Percival Prentice basic trainer, Avro Athena, Boulton Paul Balliol and Fairey "Operational" advanced trainers, and the dual-control Spitfire and 585-m.p.h. Meteor 7 jet. Many visitors were busy comparing the Athena and Balliol and, having the basic characteristics of each type fixed firmly in mind, were studying the latest performance figures quoted for the variants of each type. Comparative data for the Athena Marks 1 and 2 (respectively with Mamba and Merlin) are given below:—

	Mark 1	Mark 2
Gross weight	7,500 lb	8,210 lb
Normal tankage	180 gal	150 gal
Max. speed at 10,000ft	287 m.p.h.	287 m.p.h.
Cruising speed at 10,000ft	253 m.p.h.	223 m.p.h.
Rate of climb at 10,000 ft	1,890 ft/min	2,030 ft/min
Service ceiling	34,800 ft	28,000 ft

Boulton Paul are now offering three distinct versions of the Balliol—the Mk. 1 with Mamba turboprop, Mk. 2 with Merlin, and P.108 with Bristol Mercury radial. The all-up weights are respectively 7,860 lb, 8,175 lb, and 7,529 lb, and the maximum speeds 307 m.p.h. at 20,000ft, 305 m.p.h. at 11,500ft, and 280 m.p.h. at 10,000ft. Features of the Balliol were demonstrated in a very practical manner on the Boulton Paul stand.

Careful comparison was also made between the Fairey Primer and de Havilland Chipmunk, the former being the less familiar and attracting special attention with its ingeniously designed clear-view tandem cockpit enclosures. On the Fairey stand was a composite wing for the Primer. Percivals presented two versions of the Prentice—a standard Mk. 1, looking very smart in Argentine markings, and a Mk. 2 with supercharged Gipsy Queen. The higher output of this engine was put to very good account in the flying display.

The Fairey Operational Trainer was a standard British Naval machine in yellow finish (the type has also been adopted by the Netherlands Navy) and the Meteor 7 was the famous vermilion demonstrator. The reduced all-up weight of the Meteor 7 gives a wing loading of 40 lb/sq ft, a stalling speed of 100 m.p.h. (flaps and undercarriage down), and allows the approach to be made at 120 m.p.h.

The one new A.O.P. machine on view—the Auster A.2/45—exemplified the tendency towards increased size, weight and power. Complete particulars are withheld, but it was evident that for take-off and landing large-area split flaps are provided, and that additional lift is obtained by aileron droop. Wing-tip slots are provided, with the intention of keeping the ailerons "alive" at low speeds. The long-travel undercarriage, by reducing the angle of attack at touch-down, is said effectively to "kill" lift and thus prevent ballooning.

Looking somewhat strange in the machine park, but none the less attractive, the Supermarine Seagull amphibian flying-boat was the only machine to have a variable-incidence wing. Originally designed for observation and reconnaissance, the prototype displayed was equipped for A.S.R. work. With its speed range of 54 m.p.h. to 260 m.p.h. it represents a tremendous advance over its grandparent, the whiskery Walrus.

Many were the congratulations extended to personnel of Short Bros. and Harland and General Aircraft on the highly successful conversions made by their companies of the Sturgeon and Mosquito to suit these aircraft for target-towing and target-simulating duties. With a 16-ft winged target the Sturgeon will cruise at 289 m.p.h. Despite its excrescences, the Mosquito likewise retains a high performance. The glazed nose holds a camera and operator for recording A.A. fire laid to give a fixed error. There is a small dorsal turret for a rearward-facing observer who operates the drogue and marks the shell bursts.

CIVIL AIRCRAFT NOTES

DEVELOPMENTS in the civil aircraft field were particularly concerned with the introduction of gas turbines, both of turbojet and turboprop type, but good progress in airframe design, construction and equipment was also apparent. New aircraft representing every class greeted visitors, and even the unexpected arrival of the newly launched Tudor VIII four-jet high-altitude research aircraft, which is expected to make a valuable contribution to knowledge of operating conditions for the 20,000-40,000ft height band, only temporarily diverted attention from the entirely new and fully furnished Hermes IV, Viscount, Prince and Sealand, not to mention other

The Ambassador, after demonstrating its climbing ability, made a steep approach turn at slow speed and high rate of descent.

THE S.B.A.C. DISPLAY . . .

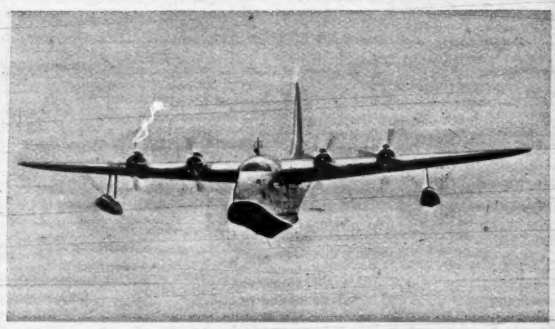
thoroughly up to date, though not quite so recently introduced, civil transports.

The Tudor VIII had taken off on its maiden flight only on the previous morning, but had already been hailed in certain not-so-well-informed quarters as the world's first four-jet air liner. Certainly the Tudors are a civil strain, and this example is intended to provide data for airliners of the future. Its Service markings and the commentator's remarks, however, quickly placed it in its M.o.S. research category.

The Vickers Nene-powered Viking, the first all-jet airliner to fly, was presented fully equipped as an indication of future development, although the power (10,000 lb) available is greater than would be economic for airline operation. It was furnished throughout as a normal B.E.A. airliner with the exception of several pieces of recording apparatus in the fuselage. Unlike the standard Viking, it has short, twin-wheeled main undercarriage legs.

It may not be generally appreciated that the Vickers Viscount appeared at Farnborough this year in full operational guise, furnished complete to British European Airways' design—this after only 2½ years from the drawing board. Moreover, the only modification necessary to the control surfaces was a minor change on the trailing edge of the rudder. Again, the power units were an outstanding feature of this new design, and it is understood from Vickers-Armstrongs that the four Rolls-Royce Darts have performed perfectly in the 12 hours the aircraft has flown. Turboprop installation, pressurization features and the prominent tailplane dihedral, make the Viscount one of the most interesting and outstanding civil aircraft at the show.

One of the most satisfying features of the exhibition was the presence of two British aircraft destined soon to fly on British airline scheduled services. It was disappointing, nevertheless, to find that the Ambassador prototypes are still devoid of furnishings. On the Airspeed stand,

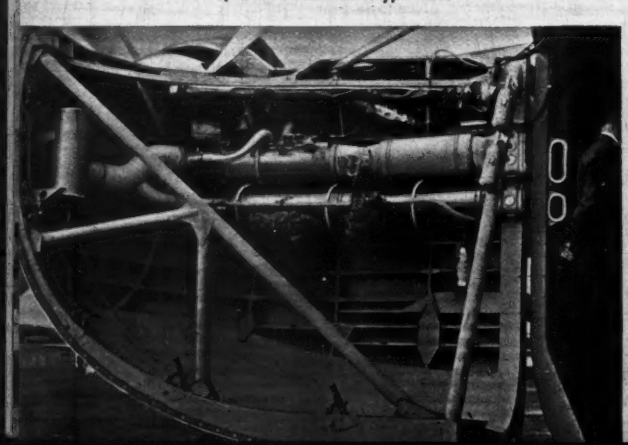


R.M.A. Scarborough, a Short Solent flying-boat, was flown by Capt. E. S. J. Alcock, B.O.A.C.'s most senior pilot, and brother of the late Sir John Alcock.

however, a model of the interior showed the layout which has apparently been designed to suit the Corporation's requirements and has no centre bulkhead or servery to break the tubular monotony. The galley is immediately aft of the flight deck, and the toilets are at the rear of the fuselage.

Ordered for British Overseas Airways, the H.P. Hermes IV was shown to the public for the first time. Although of conventional exterior design with uniform-section fuselage and single fin, the Hermes IV is truly an elegant transport aircraft. With a pleasing front fuselage appearance, clean engine installation, and well-proportioned tail units, it is as good looking as any aircraft to be found at airports at the present time.

Visitors expressed well-deserved admiration for the Short Solent flying-boat, so majestically demonstrated. On modified examples, not only has each float been placed 7ft farther out along the wings, but the wings have been



Heaters and ducts for cabins and cockpit are mounted on the door of the Bristol New Type 170.

With an all-up weight of 82,000lb, the Hermes IV was the biggest civil aircraft at the display.

Mr. Orrell presents the Tudor VIII on the day after its maiden flight.

strengthened at the points of pick-up, and the strut attachment has been redesigned, making the external difference in appearance quite noticeable. Modifications have been made to the engines, which are understood to have had the effect of eliminating vibration in the cabin. The Solents should be on the routes again after October 1st.

Although an Avro Tudor IV was expected, we must assume from the absence of any piston-engined Tudors that one was not available for exhibition. Perhaps next year we shall see the Tudor pressurized freighter of the type that is at present under development for B.O.A.C.

Now produced by Handley Page (Reading), Limited, the Miles Marathon must be included in those British aircraft which will soon be flying on scheduled services. Intended for B.E.A., the Ministry of Supply are negotiating for the order of about 40, each powered with four Gipsy Queen 71 engines. Development will continue, however, with the version powered by two Armstrong Siddeley Mambas. There are three passenger alternatives with accommodation for 14, 18 or 20. On two engines the Marathon is capable of maintaining height at full load, and with three engines the maximum rate of climb is twice that required by I.C.A.O.

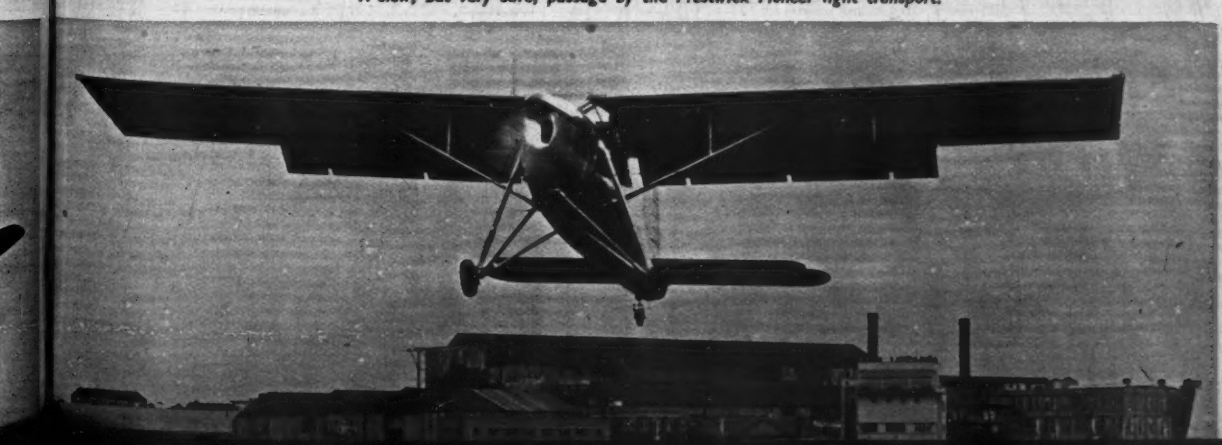
Amphibious efficiency, typified by the Gipsy-powered Short Sealand.

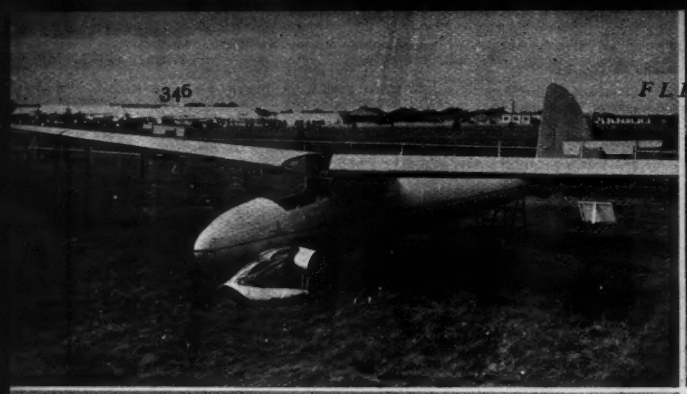
In a class of its own in size and carrying capacity for twin-engined aircraft, the Bristol New Type 170 appeared on show in convertible form. Known as the Mark XXI E, it has a light adjustable bulkhead which allows a mixed load of freight and passengers to be carried in any desired proportion, with freight in the forward cabin and passengers in the rear. Hercules 672 engines, which are now standard and differ from the original Hercules 638 in cowling and exhaust design, have been installed. They, together with the greater span, give the aircraft a higher performance, and the convertible version should make an appeal to charter operators overseas.

Among the feeder line types, the Percival Prince stands out as having the most roomy interior. The cubic capacity is 519 cu ft, not including the space occupied by the toilet. Seen completely furnished for the first time in public, it showed many features for passenger comfort which are often neglected in small types. This is the first aircraft seen with glass-weave furnishings; not only is this hygienic and easily cleaned, but is soft to the touch and as comfortable as normal coverings.

Exterior and interior finish of the eight-seater de Havilland Dove would make an instant appeal to the more æsthetic visitor, and the inclusion of D.H. fully feathering and reversible-pitch airscrews would appeal to the operators. These airscrews can now be fitted to special order on current aircraft, but de Havillands hope to standardize the reversible airscrews on all deliveries after the New Year, except where a specific request is made for their exclusion. One can never cease to appreciate the excellent view that is obtainable by all the passengers through

A slow, but very sure, passage by the Prestwick Pioneer light transport.





(Upper left) The Eon Olympia 2ans enclosure. (Above) The Baby Eon, with airbrakes extended. (Left) The red-and-blue Planet Satellite, which did not fly.

THE S.B.A.C. DISPLAY . . .

the large windows of this very up-to-date charter aircraft.

Resplendent in cream paint, the amphibious Short Sealand was representative of versatility in British design. It is particularly suitable for operations in countries abounding with inland lakes or for inter-island services. Powered by two D.H. Gipsy Queen 70 engines, it can carry seven passengers for 230 miles at 172 m.p.h., or for 300 miles at 127 m.p.h. Leonides engines are an alternative.

Portsmouth Aviation Limited exhibited the Aerocar with seats for four passengers, but since it first flew on June 18th last year the Aerocar has been under development and it had not been possible to complete the interior furnishings. Eminently suitable for charter work, a Consul was shown by the Airspeed Company in standard six-seater form.

Among future aircraft, models of which could be seen in the static exhibition, the interior design for the Brabazon I was undoubtedly the most outstanding and revolutionary. The forward cabin has been divided into separate compartments on the lower deck, each seating four passengers, whilst the upper deck is furnished with sleeping bunks. The two decks in the aft cabin are connected by a wide, rather nautical type of stairway. Similarly, the Saunders-Roe 45 flying-boat is to be furnished to accommodate both sleeping and seated passengers, and with bathroom, cocktail bar and lounge arranged on the top and lower decks. The Bristol 175, designed to the B.O.A.C. M.R.E. specification, provides accommodation for 42 passengers, or 50 at high density. The former version has a servery in the middle. The span of this aircraft is 130ft, and the length 110ft 4in; the height is 37ft 5in; gross wing area 1,775 sq ft, and all-up weight 103,000 lb.

The cockpit of the Universal Transport Aircraft under construction by General Aircraft, Ltd., has some interesting features including control columns with deer-horn shaped spectacles and with duplicated throttle boxes, one on each side of the cabin, giving the first pilot left-hand control and the second pilot right-hand control.

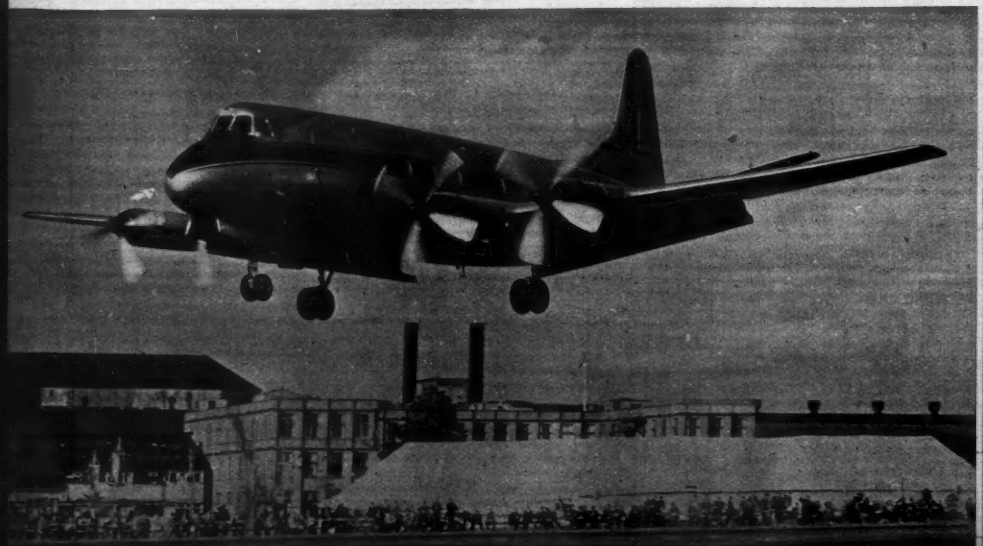
Of the smaller aircraft the Planet Satellite was the newcomer and quite the most unusual in design. It attracted justifiable attention and we look forward to seeing it in the air very soon. The Prestwick Pioneer in civil form will accommodate three or four passengers, and would be most suitable for operations into small airfields, particularly in hilly country. The Auster contingent included an Autocrat and an Avis, both standard models, the Avis particularly appealing as a comfortable four-seater. A Chrislea Super Ace was shown, with the latest wheel and pedal controls. Its neat, modern interior compares well with all-comers. Percival's exhibited a Proctor IV with a four-seat capacity, and Elliot's were prominent with the Newbury Eon and a selection of gliders, including the new Primary Eon for *ab initio* training.

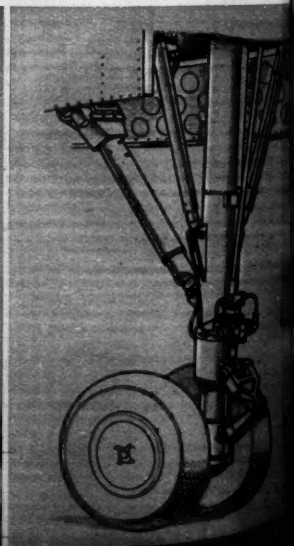
THE FLYING

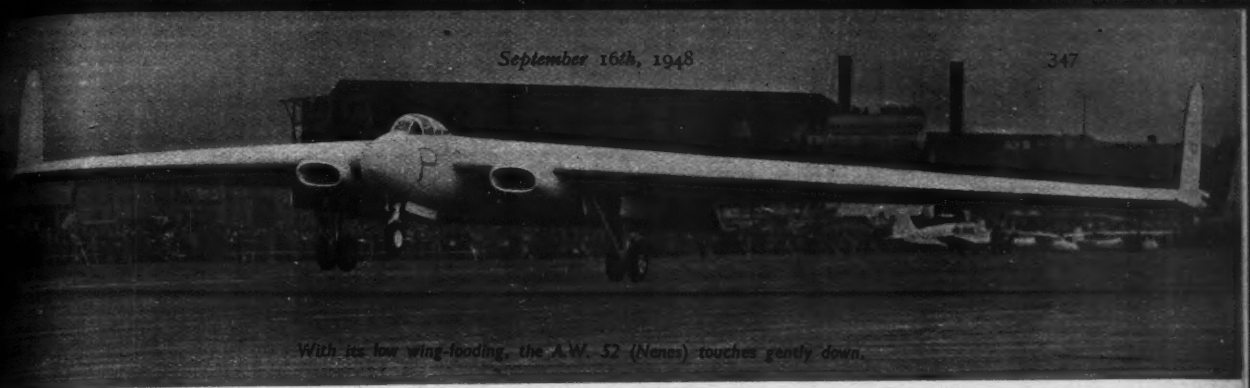
WITH sombre cloud lowering from 2,000ft, and with a chilly wind gusting across the runway, Tuesday's flying programme opened on a bold (and thunderous) note with a circus of multi-engined machines. The stocky Hastings was smartly followed by

Stately approach of the Vickers Viscount.

Twin-nose-wheel assembly of the Hermes IV.







With its low wing-loading, the A.W. 52 (Nenes) touches gently down.

the swarthy Lincoln; then by a Valetta, with underslung supply carriers and cropped tail for glider-towing; a prototype Marathon; the daintily painted Dove, with de Havilland braking airscrews; and a stalwart, lorry-laden Bristol New Type 170. Airborne, this impressive assortment of types went through a nicely synchronized succession of dives, zooms, asymmetric fly-pasts and low turns. The Hastings and Valetta showed that modern troopships can be handled like yachts, and the Lincoln gave its well-known imitation of a fighter-bomber. As the Dove passed by at a brisk pace on the power of a single Gipsy Queen, an Air Vice-Marshal was heard to observe in a disappointed tone: "*This* chap has only *one* propeller feathered." We can only hope that the Dove made amends in his estimation by its rapid braking and reversal after touch-down.

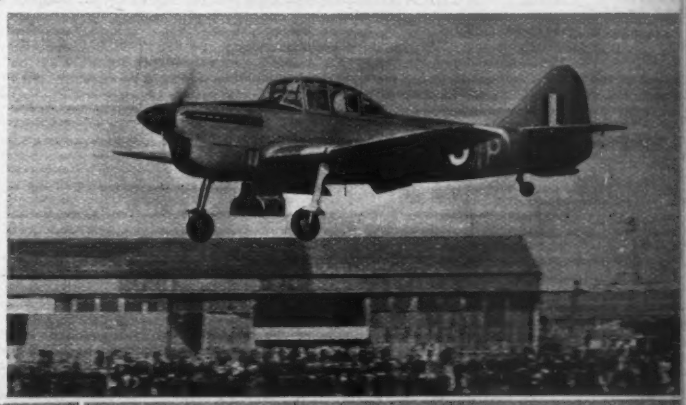
Major Oliver Stewart having remarked, in his friendly, informative commentary, that the Saunders-Roe S.R./A1 jet flying-boat would appear in advance of the Short Solent, all eyes sought to detect, in the distant grey, the unfamiliar form of this very remarkable machine. Without delay the A1 hove into sight, nosing down towards the long runway. With its keel close above the concrete and the twin Metrovick Beryls roaring with true marine vigour, the compact little Saro made its début at some 500 m.p.h., presenting a picture which will not readily be forgotten by those fortunate enough to see it. Equally memorable were the slow rolls and tight turns which followed, the rolls, in particular, being amongst the most perfect observed during the day. Perhaps the most startling spectacle of this year's display (witnessed on the Wednesday) was the "A1's" inverted fly-over, which, at one point, brought the fin within less than 100 feet of the ground.

Even without the inspiration afforded by the agile A1, the Short Solent commercial flying-boat, which now boomed over at low level, was certain to impress. It will be a sad day indeed when one of its family fails to appear at an S.B.A.C. Display, for these stately Shorts are a never-failing source of delight and interest as they dip low in their marine majesty. With only two of its four Hercules in action, *Scarborough* (the name could be easily discerned) dived, zoomed and turned, arousing some apprehension for any beverages which might have been left on the bar.

By way of contrast, the Auster 7, Prestwick Pioneer and Fairey Gyrodyne now set out to demonstrate the ability of such specialized machines to operate from confined areas. The Auster 7, of course, reproduces all the characteristics of the better-known Mk. 6, which in itself is sufficient praise; the Pioneer appeared to fly slower than any other fixed-type wing; and the Gyrodyne left no doubt as to the accuracy of the timing apparatus used to check its world's record flight at 124.3 m.p.h. (On Wednesday the Pioneer's 20-yard landing run was unequivocably established.)

Straight down the runway, at negligible height, there now roared the Boulton Paul Balliol 2 (Merlin), demonstrating its smooth, powerful ailerons by alternating rapidly from bank to bank, finally pulling up steeply into a cloud. The Balliol's performance clinched the reputation which this type founded for itself at Radlett last year. On that occasion the model flown was the Mercury-engined P.108, of appreciably lower power.

Having at former displays examined models—flying and static—of the A.W.52 flying-wing research aircraft, guests were impatient to witness the performance of the full-scale Nene-powered machine which now took the stage. Should



(Below) The thousandth Fairey Firefly, with typical loads. (Upper right) Approach of the Avro Athena 2. (Lower right) The Gyrodyne passes by.

The S.R.A/A1—attitude, normal; altitude, a shade higher than usual.

THE S.B.A.C. DISPLAY . . .

one of Britain's aeronautical artists be seeking a subject for his brush we commend to him the scene now presented: a pure white crescent in swift, silent passage beneath threatening grey cloud. Convenient as it was in throwing the shape of the "52" into bold contrast, the cloud unfortunately prevented "The Wing" from demonstrating its rate of climb, unofficially stated to be higher than 5,000 ft/min. A modest wing loading allows a low landing speed, and prompted the suggestion that, with cropped wing tips (the span at present is 90ft) the "52" might make a very useful light bomber or heavy fighter. The maximum speed officially claimed is 500 m.p.h.

A counter-attraction which coincided with the performance of the Armstrong Whitworth flying wing was the starting-up and taxying-out of the Tudor VIII. Despite rumours to the contrary it was evidently intended, with the sanction of the Ministry of Supply, to demonstrate this newly arrived high-altitude research machine, though it had no more than 4½ hours' flying time behind it. Low runs immediately evoked praise for the trim appearance of our first four-jet aircraft. No attempt was made to attain extreme speeds, but the claim that this latest Tudor will cruise at 350 m.p.h. at 25,000ft seemed well founded. The quadruple Nenes made much less noise than might have been expected, and the landing, like that witnessed on the arrival of the aircraft during the morning, was a joy.

Visitors who had sampled for themselves the "airliner comfort" of the Percival Prince light transport were surprised, perhaps, to note that the remarkably capacious fuselage did not appear disproportionately bulky when the machine was airborne. As the cold increased and the mist of rain neared the airfield, the Prince, first with two, then with one, Alvis Leonides in operation, showed its lively performance. No civil machine evoked more favourable comment from prospective buyers.

The four beautifully cowled Bristol Hercules engines of the Handley Page Hermes IV now bore this 82,000-lb airliner—the largest machine in the display—down the runway for a rapid take-off. No attempt was made by the pilot to vie with the military Hastings in dives and zooms; he was content to make low circuits which displayed to advantage the very handsome lines of the Hermes.

Next to be "given a green" was the Airspeed Ambassador—another very modern British transport with nose-wheel undercarriage. The area of the broad-span wing and the output of the two Centaurus engines allowed the pilot to pull the big, high-wing Airspeed up in a climb from take-off which, viewed from astern, reminded one of a winch-start by a very beautiful sailplane.

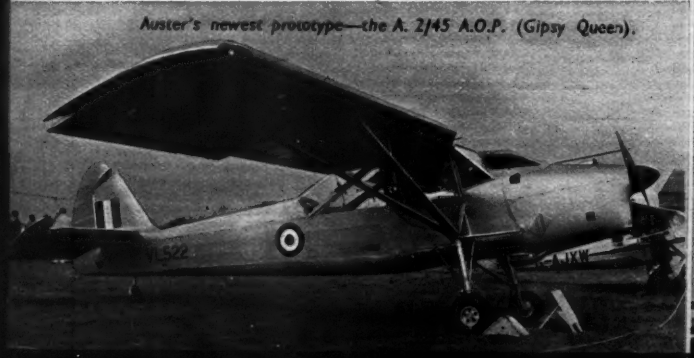
The Short Sealand gave as good an account of itself as could be expected of a light amphibian of such distinguished parentage. Only in flight could the unusually high aspect ratio of the wing be appreciated. On Tuesday, this machine seemed to exceed its allotted demonstration time and baulked the Beryl-Meteor on its first run over. After a circuit, however, Gloster's star performer came thundering low up the runway, building up to what was probably the highest speed of the day and precipitating a shimmering vapour haze before whipping round in a series of high-g turns.

As the Metro-Vick Meteor touched down, the Mk. 5 Vampire, already airborne, rolled low above it at 90 deg. to the runway. What followed was a peerless exposition of the low-level handling qualities of the R.A.F.'s new ground-attack fighter. The Vampire's performance—especially on Wednesday, when the weather was well-nigh perfect—was sheer, concentrated excitement. Exceptionally tight low turns and rapid rolls suggested that the shortened wing of the Vampire has further benefited handling qualities which are already classic. Never has such nimbleness been demonstrated at such close quarters.

As the Vampire landed, the Hawker P. 1040 was already defying the cloud (now down to about 1,000ft), swinging with tremendous verve from bank to bank, shrouding itself in flashing vapour and rolling continuously into the far distance. This performance was in the very best Hawker tradition; could one say more?

The Nenes in the research Viking were started up as the weather suddenly worsened, seriously hindering the ensuing demonstration. On Wednesday, however, under the tremendous surge of thrust from the Rolls-Royce turbojets, the Viking sailed up into the blue at a thoroughly uncommercial angle. The waiting list for joy-rides lengthens daily.

Rain had set in on Tuesday as the Supermarine Seagull amphibian appropriately set out into the murk to the tune of whining contraprops. The take-off was very short and the action of the retractable undercarriage could be seen. Having demonstrated the general handiness of this very clean marine aircraft, the pilot set the electrical screw-jack in motion to increase the incidence of the mainplane and, with leading-edge slats, slotted flaps and slotted



Auster's newest prototype—the A. 2/45 A.O.P. (Gipsy Queen).

Having performed like an interceptor, the Nene-Viking calls it a day

CREDIT WHERE DUE

NO mention is made in the accompanying text of the pilots responsible for the performances described. Their names—most of them already familiar—appear below, together with the aircraft in their charge.

Aircraft	Pilots
Ambassador	Errington
A.W.52 Flying Wing	Franklin
Auster A.2/45	Snarey
Avis	Latham
S.28/43	Lawrence
Balliol 1	Price-Owen
Balliol 2	Tisshaw
Brigand	Gibbs
Bristol New Type 170	Pegg
Theseus-Lincoln	Gibbs
Super Ace	Steadman
Vampire 5	Derry
Sea Hornet	Pike
Dove	de Villiers and Fossett
Chipmunk	Fillingham
Fairey Op. Trainer	Moseley
Gyrodyne	Arkell
Primer	Twiss
Meteor 4	Zurakowski
Meteor 7	Waterton
Beryl-Meteor	Zurakowski and Dryland
Hastings	Hazelden
Hermes IV	Hazelden
Marathon	Kendall
P.1040	Wade
Sea Fury	Murphy
Naiad-Lincoln	Randrupp
Prince	Powell
Prentice	Weldon
Lincoln	Field-Richards and Giles
Athena	Esler
Tudor VIII	Orrell
Avon-Lancastrian	Shepherd
S.R/A1	Tyson (on Thursday—Lancastar)
Prestwick Pioneer	Capper
Solent	Alcock
Sealand	Piper
Sturgeon	Booth
Viscount	Summers
Nene-Viking	Brice
Valetta	Boyd
Seagull	Quill and Lithgow
Spitfire Trainer	Morgan

ailerons at optimum setting, the Seagull sailed slowly overhead at approximately its engine-on stalling speed of 59 m.p.h.

The Vickers Viscount turboprop transport introduced itself, in conditions similar to those under which it was first demonstrated at Wisley, by beating up the runway *a la* Saro fighter, and succeeded in showing, despite the malicious "met," something of the performance conferred by its four Rolls-Royce Darts. With windscreen wipers in action, it landed in a manner becoming an ultra-safe airliner.

Succeeding the Avro Athena I, which proceeded very smoothly under the power of its Armstrong-Siddeley Mamba, but was unable to display its excellent qualities as had been hoped, came the Naiad-Lincoln. Set in the nose of this massive bomber the diminutive Naiad nacelle reminded one of a car mascot with windmilling propeller. The airscrew of the Naiad, however, turns with very real tractive effect.

The last display witnessed by *Flight* on Tuesday was that of the Avon-Lancastrian. Secrecy surrounded the new Rolls-Royce turbojets as closely as their own slim cowlings, but it can be said that the Lancastrian progressed at a very healthy pace, irrespective of whether the Merlins were in action or not.

The flying programme on Wednesday, favoured by bright sunshine and deep-blue sky, relieved here and there by dazzling white cumulus, commenced with a circus formation of the Athena 2, Balliol 1, Sturgeon, Brigand and S.28/43. Again the advanced trainer fraternity showed their excellent manœuvrability and lively performance, while the twins—the Sturgeon (Merlins) and the Brigand (Centauruses)—showed that size is little handicap. Complete with its external bombs, the Brigand was smoothly rolled, and the contraprop Sturgeon, which became airborne after a remakably short run, flew effortlessly past with one Merlin silent. The power-assisted ailerons of the S.28/43 were exercised to good effect in a series of rapid rolls, following an initial climb from the runway which was reminiscent of a rack railway. It was noticeable that while the piston-engined Balliol and Athena were brought in almost on the glide the Mamba versions were rumbled in.

A second circus, comprising the Fairey Operational

Study of a modern Naval strike aircraft—the Blackburn S.28/43

Trainer, Spitfire Trainer, Sea Fury, Sea Hornet and Beryl-Meteor, all came near to beating the flag in their eagerness to get airborne. The Spitfire Trainer and Sea Hornet both showed a splendid rate of climb in their respective classes, but naturally this was put somewhat in the shade by the terrific ascent of the Beryl-Meteor. During their brief appearances the pilot of the Sea Hornet concentrated on showing that his machine was perhaps the fastest non-turbine Naval fighter in the world, while the trainer pilots concentrated on manœuvrability and roll performance, and the Sea Fury pilot on the ability of his aircraft to climb as readily inverted as right way up.

Following a brief interruption, when three Tiger Moths, close together and on roughly the same course, flew across the edge of the airfield, the programme continued as on the opening day. Among the lighter aircraft, whose performances were somewhat hindered by weather on Tuesday, were the Super Ace, now fitted with rudder pedals, and which, on its second appearance, left little doubt as to the veracity of its claim to a 1,400 ft/min climb; the Aerocar in temporarily furnished prototype form; and the smartly turned-out Fairey Primer trainer. On Wednesday the Aerocar was able to prove itself unexpectedly lively and manœuvrable, and a brief spell of aerobatics and slow flying by the Primer indicated that it has the characteristics of a first-class elementary trainer. Before landing in an unusually short distance the Super Ace almost hung in space for a period.

The Auster A.2/45 and Avis next took the air together, but after a short climb the pilot of the A.2/45, for reason unstated, landed back on the runway and was not seen in the air again. The four-seater Avis appeared, from its rate of climb and speed, to have a good reserve of power, and undoubtedly has the ability to fly extremely slowly and to turn inside almost any other light aircraft.

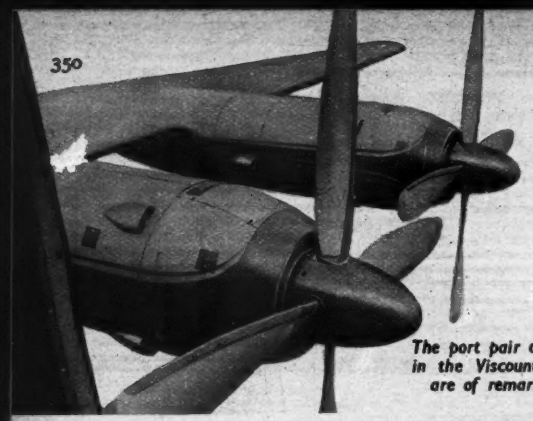
Two more trainers—the Prentice 2 and the Chipmunk—followed the Austers into the air. Many people saw the Gipsy Queen 51-engined Percival trainer put through a series of smooth and convincing low-level aerobatics, including slow rolls and stalled turns. The delightful "handleability" of the Chipmunk is now well known, but this Service version, with Gipsy Major X power plant and manually variable-pitch airscrew, came near to heading the list for short take-off of all aircraft at Farnborough. It climbed rapidly, was put through rolls at high rate and tight loops—all at low level.

POWER INSTALLATIONS

A RESTRAINED but well-justified feeling of optimism regarding the satisfactory progress which is being achieved with British gas-turbine power plants was supported at Farnborough at every turn. From the opening, both the President of the S.B.A.C. and the

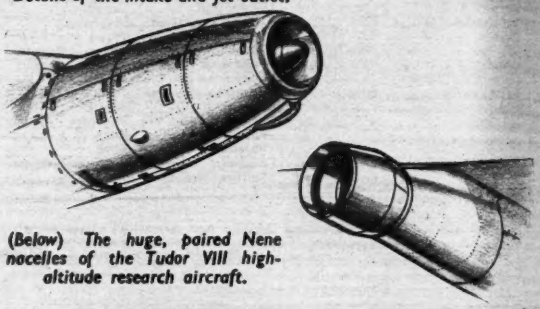
The adaptable Vickers Valetta military transport builds up speed.

The trim D.H. Sea Hornet, resplendent in the new Naval finish.



The port pair of Rolls-Royce Darts in the Viscount. The air intakes are of remarkably small area.

One of the long, slim Avon nacelles on the Lancastrian test bed. (Below) Details of the intake and jet outlet.



(Below) The huge, paired Nene nacelles of the Tudor VIII high-altitude research aircraft.

THE S.B.A.C. DISPLAY . . .

Minister of Supply singled out gas turbines for special mention in their speeches, and the importance attributed to such units by their manufacturers was immediately apparent from the predominant position they held in the static exhibition. More materially indicative of this progress was the preponderance of turbojet and turboprop power units among the important new civil, as well as military, aircraft included in the daily flying programme.

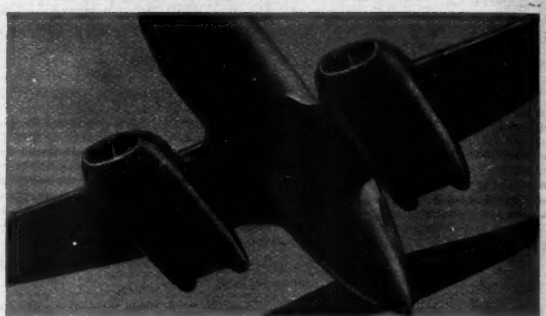
It was a healthy sign that fewer pure-jet flying test beds and more jet prototypes and research aircraft were introduced. However, for the first time the Napier Naiad with turboprop and ducted spinner intake was publicly airborne in a five-engined Lincoln layout, while a pair of Bristol Theseus flew, again in a Lincoln, in place of outboard Merlins. Two such aircraft have been supplied to Transport Command for experience and development.

The Tudor VIII, with two huge but delicately shaped nacelles each of which contains a pair of Nenes, is expected to prove a most valuable aircraft for high-altitude research. It is Rolls-Royce policy to withhold all details of their engines until they have proved themselves. For this reason Darts made their only appearance tightly cowled in the Viscount, and—as a last-minute surprise—the new and highly important Avon axial turbojet was introduced. The sole manifestations, be it said, were a name and a pair of long cigar-shaped nacelles attached Nene-like outboard in a Lancastrian test bed.

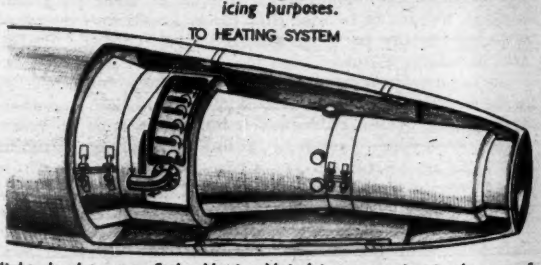
Napier Naiads are to power a second Viscount, and a representative power plant with hinged, gently tapering cowling for ready accessibility was a static exhibit.

Mamba turboprops have made marked progress in recent months, and a civil installation, as planned for the Apollo and military units, as seen in flight installed in the Balliol and Athena, bore witness respectively to compactness and performance. It was gratifying to see axial-flow annular-combustion-chambered Metrovick Beryls make spectacular first flying appearances, mounted internally in the S.R./A1 and externally in the special Meteor.

Some clues concerning D.H.106 power progress were offered by the sectioned 55-in Ghost nacelle in the exhibition hall. This was not, of course, identical with those to be used in the Comet, but there are many points in common, including both gas- and oil-heated deicing services for the intake duct and "spinner." It was learned that, on the Comet, the hot gases, after mixing with cooling air, will first be circulated around a jacketed oval-section intake duct, and thence will be led out along the leading

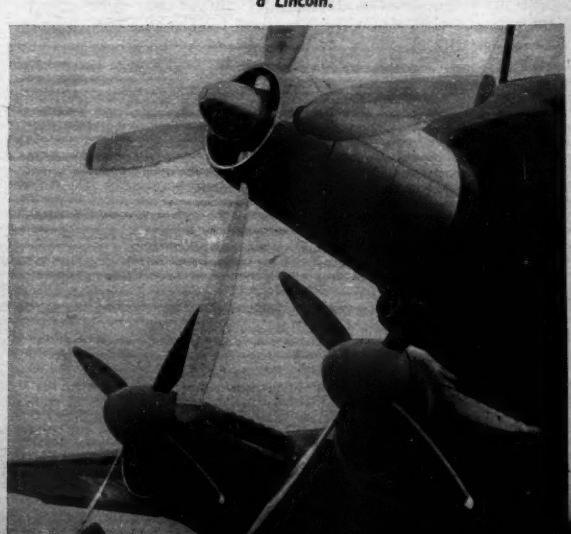


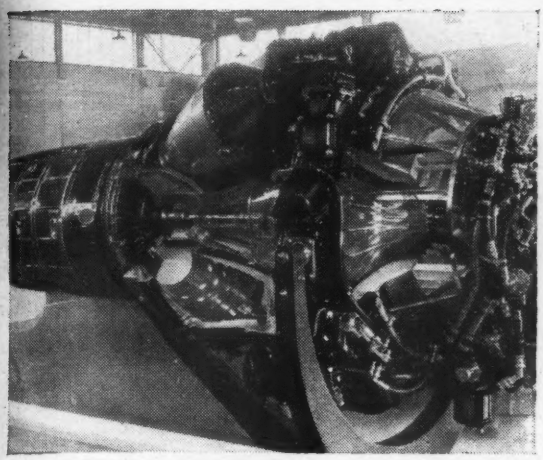
Hot air is tapped from the main gas stream of the Ghost for anti icing purposes.



Flight development of the Napier Naiad is progressing in the nose of a Lincoln.

In spite of the marked difference in engine shape, this slightly underslung Beryl nacelle in a Meteor is not easily distinguished from that for the standard Derwent.





One might be misled by this Nene, cut away to show its one moving unit, into thinking that it is quite a simple matter to produce 5,000 lb thrust.

THE S.B.A.C. DISPLAY . . .

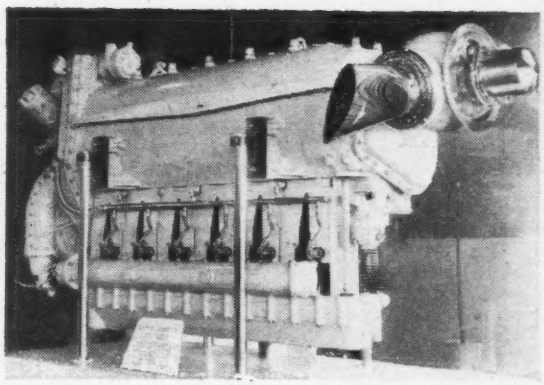
edge of the wing for thermal anti-icing. The tapping of one per cent of the gas flow results, roughly speaking, in the loss of one per cent thrust. It is not yet certain whether the long 106 jet pipes will be of round or oval section.

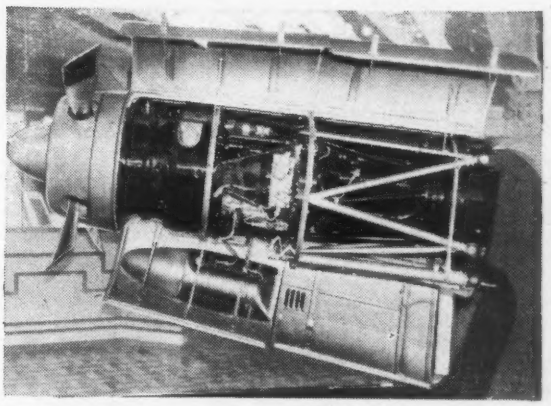
It was a disappointment that one more S.B.A.C. Display should pass without a Python being seen in the air. However, it is known that more than one trial installation has been completed and flight testing should commence this month. Small-scale production of this high-powered unit has begun. A good idea of the cowling line with air intake behind the spinner could be gained from the handsome static Python complete with contraprop.

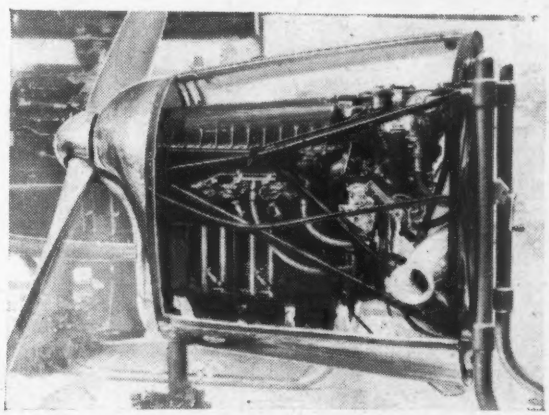
Another most important airscrew-turbine making its first appearance in public was the Bristol Proteus. Its modest station, tucked away behind other units packed on to the stand, belied the vital part it is to play in powering the Brabazon and S.R.45s. No doubt on this occasion other Bristol engines which are available for sale were considered more appropriate to the front line of the "shop window." Certainly the civil Hercules 763s, sectioned and as a power plant, and the larger Centaurus 18, as fitted to the Sea Fury, made an impressive display. It did not take a technician to recognize that the stripped-down components of the Bristol Theseus, which completed the 500-hour test run, were in extremely good condition.

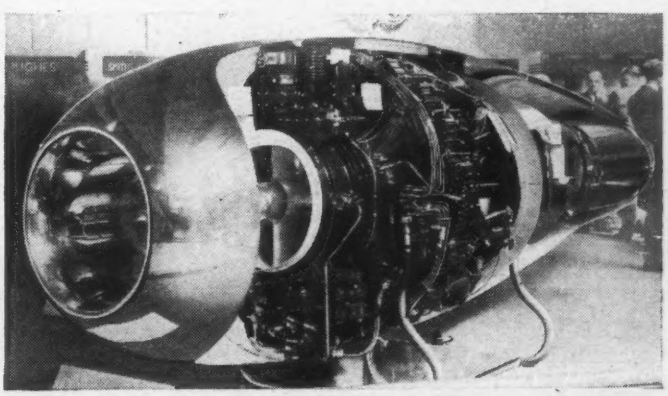
As an example of excellent design work the sectioned Derwent turbine unit would be difficult to better. That a power section so neat and compact can develop approximately 7,750 s.h.p. to drive the compressor is almost inconceivable. Accompanying it were a fine-sectioned Rolls-Royce Nene and a Derwent, also a two-speed two-stage Merlin 620 Series engine as installed in Tudors and Canadairs.

Symbolic of the way in which turbojets are entering the civil field was the striking opened-up Ghost nacelle already referred to, which dominated the de Havilland engine display. The power unit proper is similar to that in the



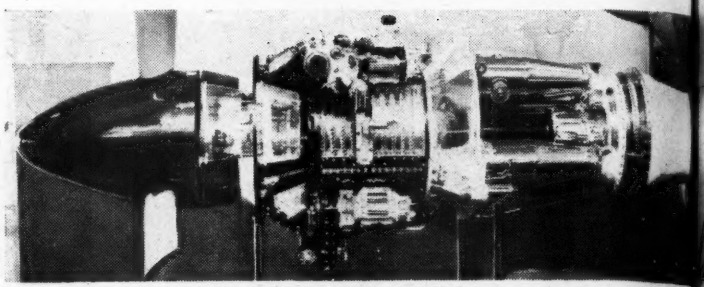






(Top right) Entirely new and completed just in time for display, the Cirrus Grenadier is a thoroughly up-to-date, supercharged, 300 h.p. six. Below it are two very different examples of self-contained power units, the upper one is the Napier Naiad 1,500 h.p. turboprop, the lower, a 145 h.p. v.p. Gipsy Major 10. (Right) A de Havilland Ghost "power egg" embodying the latest practices in thermal de-icing and partitioning of hot and cold sections.

THE S.B.A.C. DISPLAY . .



Inner secrets of Armstrong Siddeley's Mamba turboprop were revealed by this cutaway working model. Four civil Mambas will quite soon be flying as power units for the Apollo, and an example of complete installation was also exhibited.

altitude-record-holding Vampire to be seen in the aircraft park.

No less important in their own spheres are the attractive and accessible Gipsy Queen 71 and Major 10 power plants. The Major 10, with manually variable-pitch airscrew as produced for the Chipmunk, must surely be the smallest unit to be supplied as a self-contained power plant from bulkhead forward. As witness to the reliability and durability of the Goblins, which as a result of development can now be uprated by many hundred pounds of thrust for special purposes, components of the example which recently completed a unique test run under simulated operational conditions, were available for examination. The Goblin can lay claim to being the first British power unit and probably the first of all turbines to exceed the speed of sound.

Interior details of the two similar but competitive turboprops, the Naiad and Mamba, have been released during the year. As might be expected, the fine fully sectioned working models of these units attracted much attention and admiration. A comparison of the treatment of reduction gearing was particularly interesting. Perhaps by next year it will be possible to examine internal construction of the third small turboprop, the two-stage centrifugal Dart. Only the Mamba holds a type certificate at present.

Two entirely new light piston engines, the Blackburn Cirrus Bombardier and supercharged Grenadier, were examined with interest. The Bombardier is expected to complete type test formalities and to fly during the next few weeks. The smaller Cirrus Major and Minor should soon be seen with v.p. airscrews.

Alvis Leonides received prominence as the power units of the Gyrodyne, holder of the helicopter speed record, the Bristol helicopter and the popular new Percival Prince transport. The horizontally-mounted Leonides helicopter power assembly and rotor drives were the subject of an interesting working installation displayed by the Bristol company.

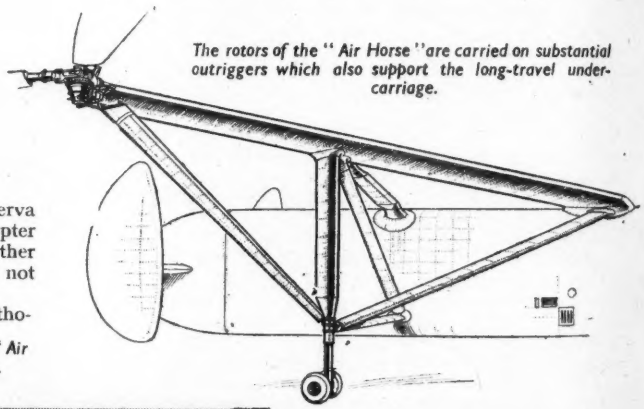
THE HELICOPTERS

FROM the novelty point of view, the two Cierva machines were the attraction in the helicopter park. Both are new; so new, in fact, that neither has yet flown. But it is hoped that first flights will not be long delayed.

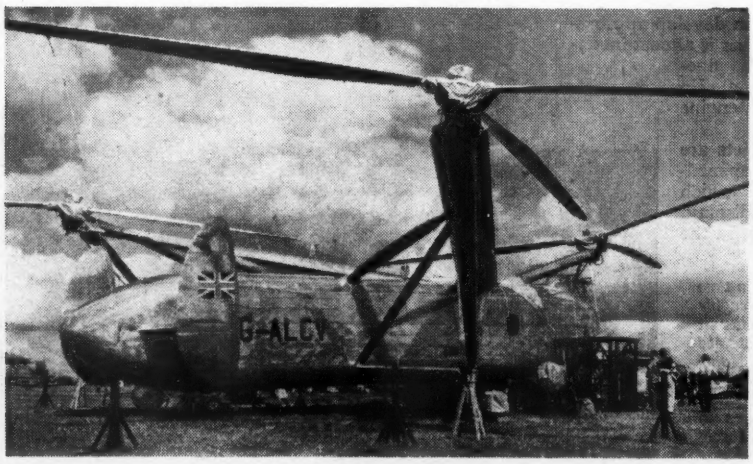
Of the two, the W.11 "Air Horse" is the more orthodox, with its three rotors placed in the form of a triangle, with two side by side at the back and a single rotor in front. To simplify the transmission from the single Merlin engine all three rotors turn in the same direction. Torque reaction is normally looked after by a built-in tilt of the rotor heads, and manœuvring by differential control of the rotors.

One of the drawbacks of the single-rotor helicopter is its basic lack of stability. This may be overcome by such additional mechanisms as the Bell Stabilizer bar, the Hiller servo control and the still more recent aerofoil stabilizer developed by the American Coast Guard Rotary Wing Development Unit. In the "Air Horse" the use of three rotors should ensure stability and make c.g. location less critical. In any case, a loaded weight of 17,500 lb could scarcely be carried on a single rotor.

It cannot be said that the "Air Horse" is a good-looking aircraft, with its sprawling outriggers and rather slab-sided fuselage, but it is certainly roomy and will give ample comfort for the 24 passengers which it can carry, especially in view of the fact that it is not intended for long-distance journeys. As a freighter, the W.11 will carry a payload of from three to four tons.



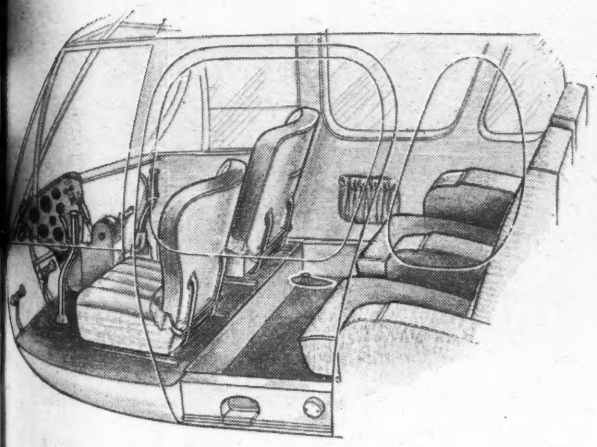
The rotors of the "Air Horse" are carried on substantial outriggers which also support the long-travel undercarriage.



The largest helicopter in the world. The Cierva W.11 "Air Horse" has three rotors driven by a single Merlin engine.

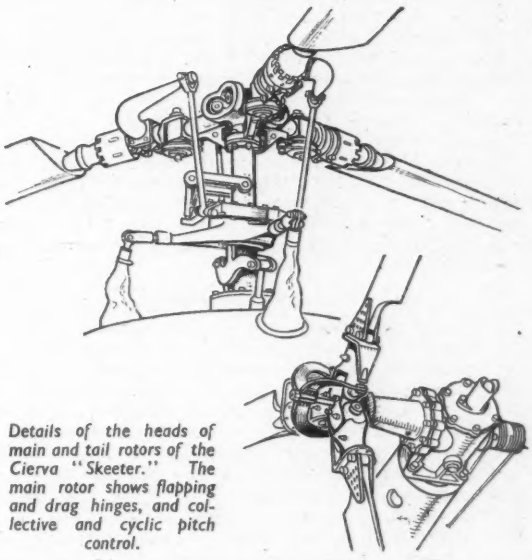
The "Skeeter" is at the other end of the scale, with an all-up weight of just over 1,200 lb. It is thus one of the smallest two-seater helicopters in the world. Basically it follows the classic Sikorsky layout, but the rotor-head details, transmission, etc., have been specially designed for low production cost. It is intended to lay down a fairly large batch, since only in that way can manufacture be cheapened.

Training is one of the primary functions foreseen in the design of the



Passengers in the Fairey Gyrodyne are given a greater degree of comfort than is usual in a helicopter. Note also the simplicity of the pilot's controls, made possible by the special Gyrodyne type of rotor head.

The Cierva "Skeeter" is one of the smallest two-seater helicopters in the world (Gross weight 1,200lb.) It is specially designed for low-cost production.



Details of the heads of main and tail rotors of the Cierva "Skeeter." The main rotor shows flapping and drag hinges, and collective and cyclic pitch control.

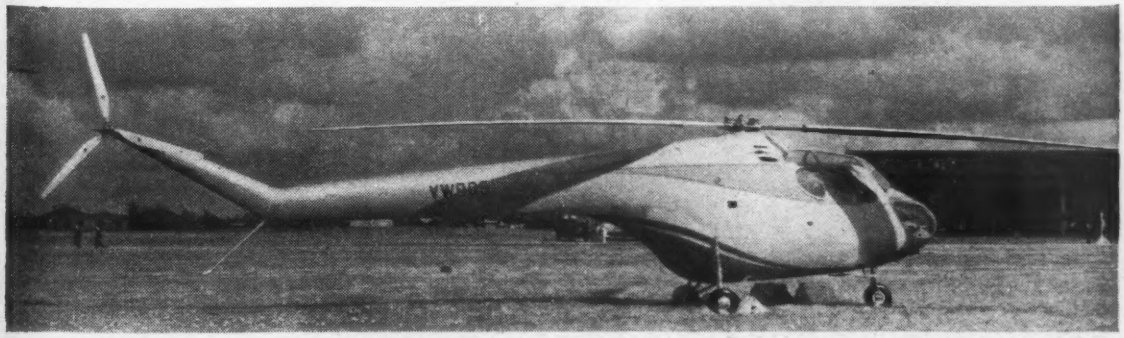
"Skeeter," but Service operations have also been given full consideration, and the low price which it is hoped to achieve should help to introduce the machine in the private-owner category.

The "Skeeter" shown at Farnborough had the Jameson engine, but if that should not go into production in time it is likely that a Gipsy Major may be used instead. It could be mounted transversely, and side panels would then give easy accessibility.

Main data of the "Skeeter" with the Jameson engine are: Weight empty 810 lb, loaded 1,210 lb. Rotor diameter (three-bladed) 29ft. Estimated cruising speed 75 m.p.h. Range with two up 155 miles; solo 270 miles.

One of the Fairey Gyrodynes shown was the prototype on which S/L. Arkell established a world's speed record of 124.3 m.p.h. The other was fully furnished with a degree of comfort amounting to luxury. It is to be doubted that any other helicopter has provided such comfort for its passengers. The seats are well upholstered, and the view is quite remarkably good, even from the passengers' seats. One of these days we hope to have the opportunity to report on the pleasures of flight in the Gyrodyne. S/L. Arkell gave some convincing demonstrations of its capabilities at Farnborough, and its high-speed performance was particularly appreciated. Hovering, and vertical ascent and descent have come to be taken for granted.

Considerable disappointment was felt at the absence from the flying programme of the Bristol 171 and the total absence of the Westland-Sikorsky helicopter. The explanation in both cases appears to be that insufficient experience since the installation of the Alvis Leonides engine had dictated a cautious course. Visitors were certainly able to inspect the Bristol on the ground, and were much impressed by its workmanlike appearance. Mr. Hafner's very neat rotor-head mechanism in particular came in for much favourable comment from the more knowledgeable



This view brings out the "tadpole" shape of the Bristol 171, derived from the need to give droop clearance to the main rotor blades and ground clearance to the tail rotor.

THE S.B.A.C. DISPLAY . . .

STATIC DISPLAY

THE atmosphere that pervades the annual S.B.A.C. display and exhibition is somehow quite different from that found at any other event, and this applies equally as strongly to the static side of the show as to the more active and spectacular sections. Perhaps it is due to the employment of standard lettering for the name boards of the stands and to the uniform colour scheme of cream and blue. Yet this is not all, for no matter how intangible, there is, nevertheless, a quite recognizable air of purpose and quiet efficiency throughout: the absence of ballyhoo and the effulgent glitter which seems to be symptomatic of most other industrial shows is a very pleasant relief.

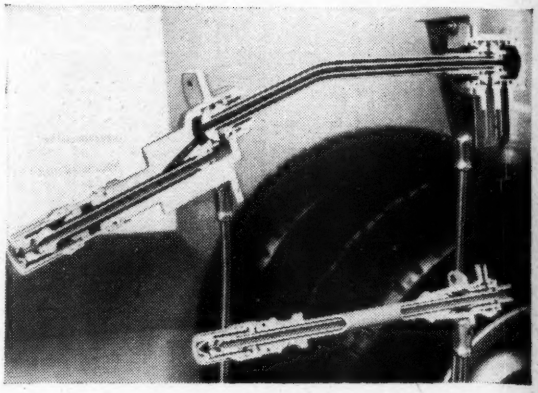
Naturally enough, when about two hundred exhibitors are concerned, it is impossible to give even a condensed précis of all the exhibits, so that in making this review of the static display, we feel it to be of greater value to present a concise statement of some of the more interesting novelties which engaged our particular interest. But before making our tour of the East and West exhibition halls, it might well here be stated that so far as organization and cumulative effect were concerned, the static section of the display this year achieved a new high level. Although the display and exhibition took place at Farnborough, the Royal Aircraft Establishment took no part and was in no way concerned. Nevertheless, the R.A.E., as the cradle of British aeronautical development, was represented in the show—a Westland-Hill Pterodactyl 1B of *circa* 1925 was slung from the roof in the north-west corner of the West exhibition hall. It is, of course, entirely possible that, in the flush of organizing the exhibition the removal of this ancient aerodyne was overlooked.

Itemized Interests.

In a sense as advanced as was the Pterodactyl in its day, the Planet Satellite aircraft, which could be examined in the aircraft park, was also exhibited in model form, together with some full-scale structural components, on the Redwing stand. Redwing, Ltd., were the constructors of this machine and no small credit is due to them for pioneering the construction of an all-magnesium aircraft.

Among the numerous filtration units exhibited by Vokes, Ltd., were a pair of air filters used in the rear bearing cooling circuit of the de Havilland Goblin. The actual units shown were as taken from the engine's recently concluded 500-hour test. They are about 9in long and 2in in diameter and pass 0.05 lb of air/second at 35 lb/sq in at 80 deg C.

Hordern-Richmond, Ltd., featured the Aeromatic propeller which they now manufacture under licence and, in addition to examples of Hydulignum improved wood in a variety of forms ranging from helicopter main and tail rotors to press-form tools, also exhibited the airscrew blades



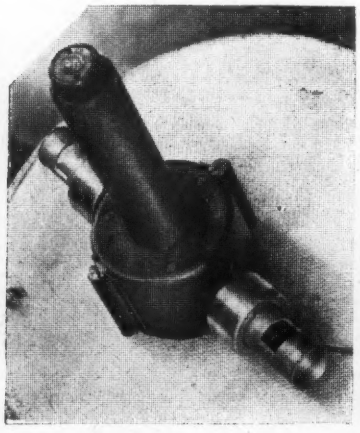
The two sizes of new type spill burners could be seen in section on the Dowty stand.

to be used in conjunction with Rotol hubs for the Bristol Brabazon I.

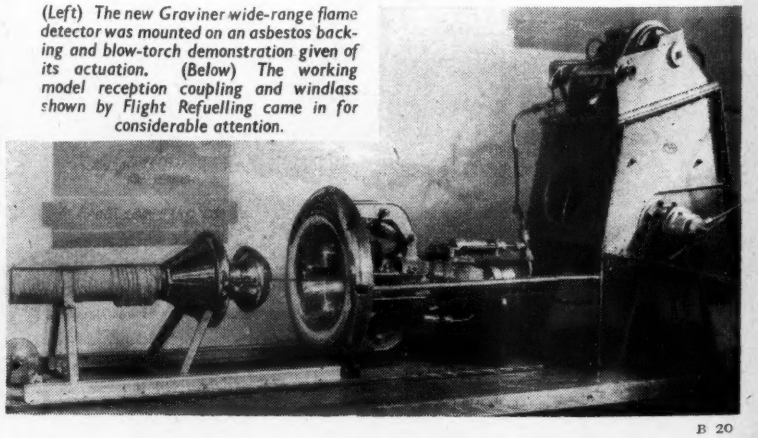
An entirely new development by Dowty Equipment, Ltd., were spill burners and fuel galleries for gas turbines. The prime feature of this new form of burner is that the degree of fuel atomization given remains constant irrespective of fluctuation in fuel feed. Of the two types shown, the larger has a flow capacity of 80 gall/hr at 1,000 lb/sq in inlet pressure, whilst the smaller unit delivers 40 gall/hr under the same feed pressure.

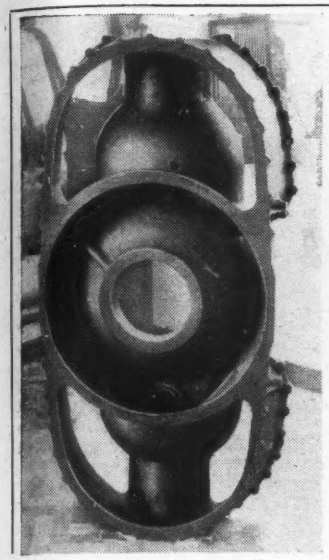
Whilst on the subject of gas turbine combustion, it is appropriate to refer to the new annular combustion chamber shown by Joseph Lucas, Ltd. The unit exhibited was suitable for a 1,200 h.p. engine, and for a length of 27in had a maximum diameter of about 21in. The main features of the design are downstream injection, using nine equally spaced burners, with primary air injection by the conventional colander principle, each colander being attached to a flat backplate: dilution is introduced by the flower-pot principle. This particular chamber has been tested under inlet density conditions of 0.23 lb/cu ft and inlet velocity of 220 ft/sec. Under full load conditions, the blow-out value is reached when the air/fuel ratio is 1,000:1.

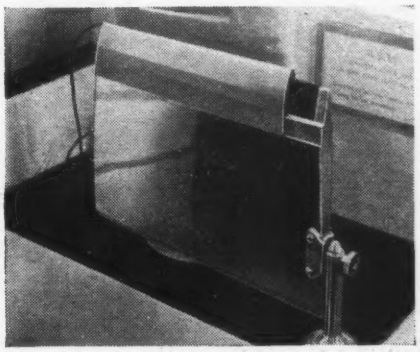
One of the latest innovations by the Marconi Co. is their Type AD7092 aircraft automatic direction finder which, in its simplest form, weighs only 30 lb. This gives automatic visual indication of bearings with simultaneous uninterrupted aural reception, and remote or direct manual control of the loop. Normal communication reception by telephony, MCW and CW signals is provided either on the loop or on the non-directional whip aerial, whilst radio range reception, with simultaneous voice, is given on all these functions. The latest form of loop aerial devised by Marconi is their Type 1324 suppressed aerial unit, which,

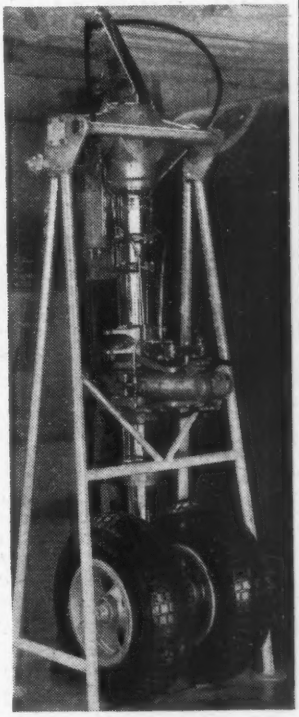


(Left) The new Graviner wide-range flame detector was mounted on an asbestos backing and blow-torch demonstration given of its actuation. (Below) The working model reception coupling and windlass shown by Flight Refuelling came in for considerable attention.









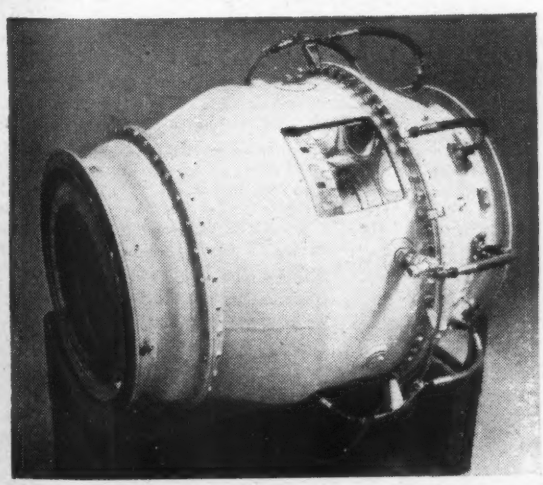
(Above) The new Rotol thermal de-icing system for dural blades was shown in full-size and sectioned examples. (Left) This fine example of cast work by J. Stone and Co., is for Napiers and might be an intake casing for coupled Naiads. (Right) The Viscount, nosewheel assembly.

THE S.B.A.C. DISPLAY . . .

comprising both loop and sense aerials, is recessed into the top of the fuselage, the aperture being covered with bonded fibreglass, moulded flush with the fuselage contours so that there is no projection.

Boulton Paul Aircraft, Ltd., had on their stand two examples of the new BPA high-fidelity power-control system which employs electro-hydraulic power to translate control movement to displacement of the aerofoil control surfaces. Essentially, the system provides control of the volume rate of fluid flow by the positional error, the pressure in the system depending on the external forces and those arising from the accelerations of the masses of the aircraft control system. The complete unit is removable by uncoupling the mechanical communication between the control column or rudder pedals and the control surfaces, and, of course, the electrical communications to the electric motor; the hydraulic circuit is permanently closed and does not require to be broken.

An extremely light material, "Flexelite," in the form of a thin skin of synthetic rubber bonded to a nylon outer casing, has been developed by Marston Excelsior, Ltd., for fuel tanks. Large tanks weigh but 5 oz/sq ft of surface area, whilst smaller tanks (up to 25 gallons) have an equivalent weight of 2.4 oz/sq ft. A 680-gallon tank has been made weighing only 31 lb. The rubber used is highly resistant to hydrocarbons and maintains its properties at temperatures between −63 deg C and over 90 deg C. Layers of sponge rubber coating can be added to make the tanks self-sealing, and such units are being supplied for the de Havilland Vampire. Another new item by these exhibitors was an Onozote-Fibreglass-Nuron sandwich material of use for structural partitions, fairings, etc., with particular advantages for radar scanner enclosures, since the structural materials afford high radio wave penetrative factors.



Part sectioned to show the arrangement of baffles and burners, the annular combustion chamber by Joseph Lucas was an interesting exhibit.

Fairey Aviation, Ltd., had an interesting new airscrew design on view, intended for turboprop installations in the 2,000-2,500 h.p. class. The airscrew employs electric constant-speed actuation with mechanical actuation of its feathering and reverse-thrust braking functions. The constant-speed rate of pitch change is 8 deg/sec with a feathering and braking pitch change rate of 40 deg/sec. Incidentally, the Fairey lineage of aircraft types was displayed by a motorized line of models, running along a painted aircraft carrier deck, in chronological order dating from the Fairey 3D of 1921 up to a pair of blank spaces carrying 1948 cards lettered "New secret type."

Cossor Radar, Ltd., had on view the miniature Gee receiver which they have especially developed for civil aviation. The equipment is comprised in three small units with a total weight of 35 lb and the set operates on 80 or 115 volts, 400-2,000 cycles AC, and 22-29 volts DC. Ten radio frequencies throughout the Gee band are selected by means of a switch on the indicator and it is possible to select up to six different PRF crystals enabling the set to operate on any of the new Chains or Gee Track Guide systems.

Two new developments by Sir George Godfrey and Partners, Ltd., are the air turbine cold-air unit for cooling aircraft pressure cabins, and the new Marshall centrifugal cabin superchargers. In operation, air delivered from the cabin supercharger is ducted to the inlet of the impeller in the cold-air unit, where it is further compressed: it then flows through an inter-cooler before passing from the turbine on its way to the aircraft cabin. In flowing through the turbine, the air is cooled as it gives up energy to the turbine disc which, in turn, drives the compressor. The two types of centrifugal supercharger on view for the first time are both two-stage units, the smaller to supply 15 lb

THE S.B.A.C. DISPLAY . . .

of air/minute, and the larger to supply 30 lb of air/minute, both units maintaining 8,000ft conditions in the cabin at 50,000ft ambient conditions.

An entirely new gyro magnetic compass, the GIII, has been developed by Henry Hughes and Son, Ltd., and employs the output of magnetic detection elements to monitor a directional gyro. Accurate deadbeat indications free from northerly turning error are provided, and the system is self-contained in five units. An output is available to monitor an auto-pilot and to operate repeater indicators. Another new development in navigational instruments was also to be seen on this company's stand, namely, the periscopic sextant. A periscopic sight tube is used which protrudes only 3in through the aircraft's skin in a hatch built into the aircraft as a permanent fixture, with safety locks for maintaining pressurization. The magnification is ×4 with a 7 deg field of view, whilst the artificial horizon is on the orthodox bubble principle. The integrating system will give the average altitude for any length of shot up to two minutes.

The latest idea on airscrew de-icing held by Rotol, Ltd., was to be seen in their example of a duralumin blade fitted with a stainless steel leading edge which shrouded a carbon-impregnated electrical-conducting rubber shoe. Although it will vary according to airscrew size, the normal wattage per blade is envisaged as about 1,800. This development is due to undergo winterization trials in Canada this year.

In the field of plastics, an engine cooling fan for the Fairey Gyrodyne was shown by Aeroplastics, Ltd., in a phenol-formaldehyde synthetic, this exhibit being adjacent to a pilot's seat stressed for 25 g to S.B.A.C. standard design, and manufactured by the same company.

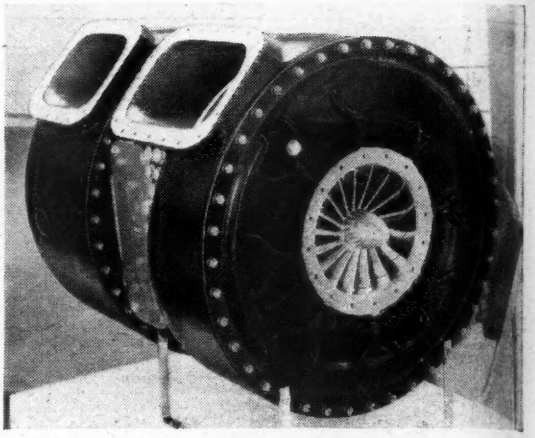
The Dunlop Rubber Co. have devised a pressure seal for control rods piercing a pressure cabin. A highly polished tubular rod slides in the honed bore of a bush housed in a cast casing with suitable fastening flanges. Internal rubber seals and lubricating rings are incorporated which function at extremely low temperatures. The range of seals varies from 2 B.A. up to 2in diameter rods both for linear and rotary motion.

The Graviner Co., constantly endeavouring to reduce the aircraft fire hazard, have developed a new large-range temperature-sensitive detector element, and have also devised a neater, more reliable and efficient inertia switch to operate at accelerations of 3 g and over to displace the current 6 g switch. They are also devoting attention to a switch actuated by skin deflection.

Among the many examples of their casting work, J. Stone and Co., Ltd., exhibited a large coupled intake casing labelled as being for the Napier company. This looked as though it might be intended for coupled Naiad units.

Aerofoil leading-edge de-icing in the latest form devised by T.K.S. (Deicing), Ltd., employs a newly developed highly viscous fluid, but of greatest interest in this connection is the emission system. The fluid is piped to multiple channels inside the leading-edge skin and seeps out through rows of spanwise 0.006in slots cut in the skin. There is no deformation of the aerofoil contour.

In reviewing this diverse assortment of new developments, we have made no attempt to give a complete picture of everything new to be seen in the exhibition halls. Nevertheless, this résumé does serve to indicate the trends of development going forward in the various fields of activity which go to make up the greater background of our aeronautical industry. There can be little doubt that the scope and many-sidedness, the quality of workmanship and design ingenuity seen by the general public for the first time, created a profound impression from which nothing but good can well result.

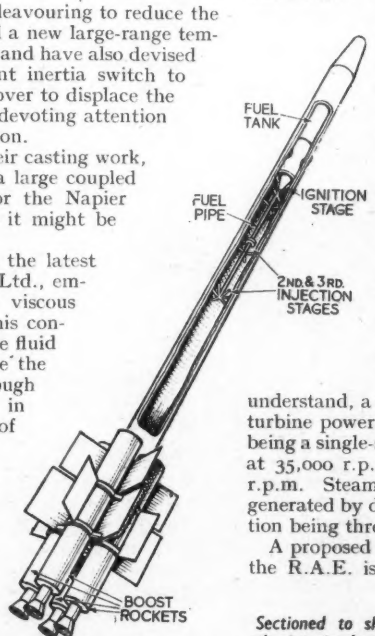


This two-stage centrifugal cabin blower was exhibited by Sir George Godfrey and Partners.

MINISTRY EXHIBITS

ALTHOUGH sited in the West exhibition hall, the respective stands of the Ministry of Supply and the Ministry of Civil Aviation cannot, we think, justifiably be included among the exhibits of commercial concerns and we are, therefore, giving them a separate place. On the M.o.S. stand were exhibits of activities at the Royal Aircraft Establishment itself, at the Telecommunications Research Establishment and the National Gas Turbine Establishment.

Among the exhibits was a 7.2in diameter supersonic research model ram-jet that has actually been used for experimental flights, and, as exhibited, was sectioned to show the interior layout. In operation, it is initially boosted with four rockets to a Mach Number of 1.4 which produces by shock and diffusion in the duct a pressure rise of 3 atmospheres. The air mass flow at sea-level is 8 lb/sec, in which the combustion of 0.4 lb of fuel/sec produces a temperature rise of 1,500 deg. K. The exit velocity of the exhaust gases is about 3,700ft/sec and the net thrust about 400 lb. Sectioned models of ram-jet combustion systems were also on view, illustrating the necessity to use baffles for the creation of turbulence in the combustion zone to slow down the air speed to match the rate of flame propagation.



Sectioned to show the interior layout, this ram-jet supersonic research model was shown on the M.o.S. stand.

A little model that took our eye was, we found on inquiry, specially designed for use in the take-off and landing tests of the 1/10th scale model S.R./45 flying boat. Work on this is shortly to start and, we understand, a lake will be used for the purpose. The model turbine power unit is designed to give 1.6 h.p., the turbine being a single-stage impulse type with a single nozzle running at 35,000 r.p.m. and driving the airscrew shafts at 4,500 r.p.m. Steam, at a working pressure of 45 lb/sq in is generated by decomposing hydrogen-peroxide, the consumption being three pints and the duration five minutes.

A proposed new test frame—to be called Hercules—which the R.A.E. is now designing was also exhibited in model form. It will accommodate aircraft of at least 200ft span and will also cater for large aircraft with swept back and delta wing shapes up to a maximum size of 200ft by 125ft.

The Plastics Structures Section of

(*Continued on page* 358)

PERSONALITIES AT FARNBOROUGH

(1) Col. W. C. Devereux (International Alloys), The Rt. Hon. G. R. Strauss, Sir Archibald Rowlands (M.O.S.) and Sir Frank Spriggs (Hawker Siddeley)

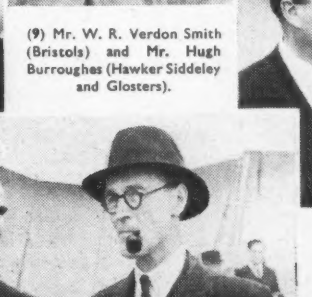
(3) Mr. C. H. Chichester Smith, Sir Richard Fairey and Mr. Richard Fairey, all, of course, of the Fairey Aviation Co. board.

(2) Cdre. R. I. Agnew, R.C.N., Capt. Caspar John, R.N., Capt. A. D. Torlesse, R.N., and Capt. H. St. John Fancourt, R.N.

(4) Mr. George Cornwall and Mr. B. R. S. Jones of Heston Aircraft Ltd.

(5) Vice Ad. Sir Charles Daniel, R.N., Vice Ad. R. Portal, R.N., Vice Ad. G. E. Creasy, R.N., Rear Ad. L. D. Mackintosh of Mackintosh, R.N., and Vice Ad. Sir Cecil Harcourt, R.N.

(6) Mr. Wilkinson, M.O.S., and Mr. Scott-Hall, Director of Technical Development.



(9) Mr. W. R. Verdon Smith (Bristols) and Mr. Hugh Burroughes (Hawker Siddeley and Glosters).

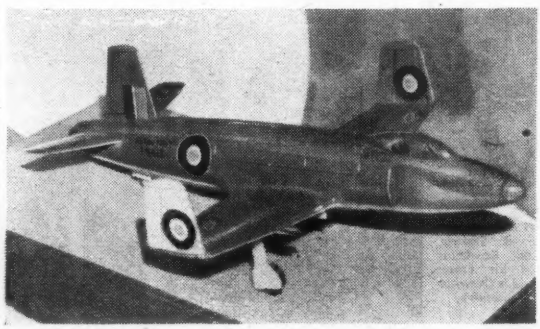
(8) Capt. K. J. G. Bartlett (Bristols), right, with Mr. E. C. Bowyer, Director S.B.A.C., who was largely responsible for organizing the display.

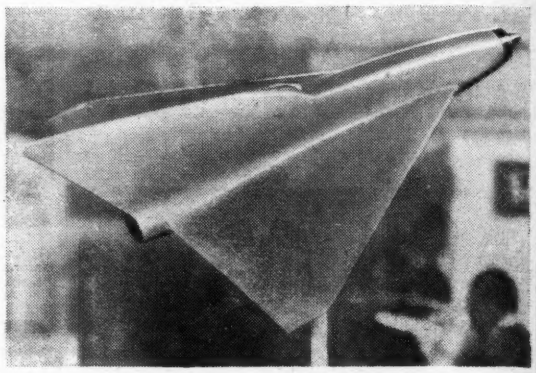
(7) Sir Alliott Verdon-Roe (Saro) and Mr. W. P. Savage of Napiers.

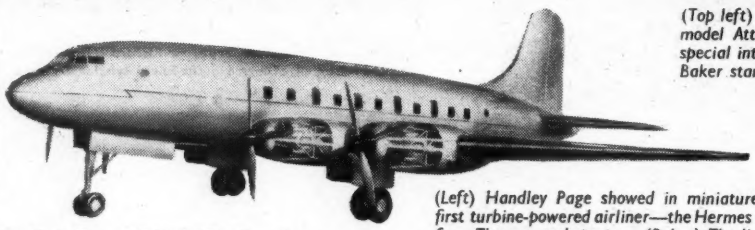
(10) Air Marshal Sir William Elliot, A.O.C. in C. Fighter Command, with A. Cdre. D. F. W. Atcherley.

(11) Capt. Mackisray (B.E.A. Rome), Mr. Cox (Western Airways) and A. Cdre. Whitney Straight (B.O.A.C.).

THE S.B.A.C. DISPLAY . . .

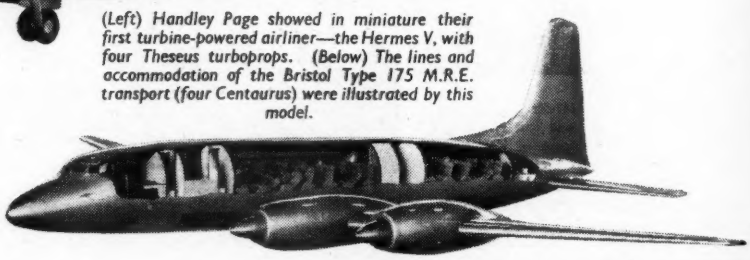






(Top left) In the absence of a full-scale example, a model Attacker, with folding outer wings, proved of special interest. (Above) Prominent on the Martin-Baker stand was this model of a single-jet fighter of Delta form.

(Left) Handley Page showed in miniature their first turbine-powered airliner—the Hermes V, with four Theseus turboprops. (Below) The lines and accommodation of the Bristol Type 175 M.R.E. transport (four Centaurus) were illustrated by this model.



the R.A.E. exhibited Mk. I and Mk. II plastic wings, employing surface shells of a special long-fibred asbestos bonded with resin, the interior of the wing being stabilized with a honeycomb filling. A thick, stiff skin which is free from rivets is produced and can be polished to a high degree of smoothness. The weight of the Mk. I wing was 96.5 per cent of the metal equivalent for 117 per cent of the strength requirement. The Mk. II wing weighed 86 per cent of the metal equivalent and failed at 93 per cent of the strength requirement.

The Ministry of Civil Aviation exhibit was devoted primarily to presentation of the new VHF area coverage scheme at present undergoing trials. The purpose of the area covering scheme is to provide two-way speech communication between the ground station (in this case, Uxbridge Air Traffic Control Centre) and aircraft, over a much greater area than is normally covered by a VHF system. With an aircraft at 5,000ft, communication can be carried out over the major part of the south-eastern Flight Information Region as compared with the 50 miles range which would be the maximum obtainable under the same circumstances from a single ground station.

Four separate transmitting and receiving stations are in use at Birdlip (Gloucester), Pulham (Norfolk), Riddlesdown (Croydon), and Lympne. Communication from an aircraft to Uxbridge is by radio telephony to the nearest receiving station, or stations, and thence by land line. Uxbridge replies by the same route, transmitting from all four stations simultaneously.

Other exhibits shown on the M.C.A. stand were a VHF cathode-ray D/F equipment, a typical VHF ground station, and two typical VHF aircraft installations.

THE EXTRA TURN : Fastening the cockpit cover over John Cunningham who demonstrated the supersonic D.H. 108 on both Saturday and Sunday.

THE PUBLIC DISPLAYS

THE general public were admitted to the S.B.A.C. display for the first time on Saturday, September 11th, and from the large attendance—about 100,000 people turned up on that day—it may be judged that the public are extremely interested in British Aviation. Both exhibition halls were well filled with visitors, many of whom were parties from aircraft firms and accessory manufacturers who had chartered buses for the day's outings, some having travelled over 100 miles to Farnborough. The weather, which had during the morning looked dull and cloudy, cleared after lunch, and was excellent for the flying display, which went off smoothly and rapidly with no delays. One highlight of this was the demonstration of the D.H.108 by John Cunningham; this machine had not ap-

THE S.B.A.C. DISPLAY...

peared during the week owing to other commitments; the Vampire, in the hands of John Derry, and the Hawker P.1040, with "Wimpy" Wade at the controls, both put up impressive demonstrations of speed and manœuvrability, and the Meteors, both single-seater and trainer version, were equally impressive.

Among the civil aircraft demonstrations the most interesting was that of the Ambassador. Piloted by George Errington, this machine was taken off on one engine only, the port airscrew being feathered before it taxied on to the runway; the Ambassador then climbed away on the starboard engine and manœuvred with apparent ease in full view of the spectators, turning gracefully both "with" and "against" its operating engine, and finally made a smooth approach and landing, still with the port airscrew feathered. This was the first complete single-engined demonstration in public and only the third time this feat has been performed on the Ambassador.

After finishing its demonstration flight the de Havilland Dove put down on the runway in the normal manner, and, by the use of its reversible pitch airscrews, came to rest in a very short distance and then reversed back along the runway. Possibly the sudden burst of power following selection of reverse pitch may have misled the uninitiated into thinking the aircraft was about to take off again.

Of the smaller aircraft, the Auster Autocrat flown by Lowry showed off the Goodyear drift undercarriage on both taking off and landing, and this performance was effective although the wind was not so favourable for drift demonstrations as it had been earlier in the week.

George Errington completes his single-engined performance on the Airspeed Ambassador.

The Goodyear mechanism for drift undercarriage is housed entirely within the hub of the wheel itself. This is made possible by the use of the Goodyear "single spot" hydraulic brake, which is mounted on the side of the wheel, leaving the hub itself free for the inclusion of the castering device.

At the conclusion of the flying display the public again visited the exhibition halls, and it was only when the stands were being covered with dust-sheets and police were shepherding people away from the entrance to the halls that the bus queues formed, and the hundreds of cars began to make their way through the exits. Unfortunately, on the following afternoon, Sunday, September 12th, the weather was extremely poor, and the flying display ceased, after the demonstration of the D.H. 108.

THE NEW AIRCREW ENLISTMENT SCHEME

THE Secretary of State for Air, Mr. Arthur Henderson, speaking at the R.A.F. Association's Festival at the Albert Hall on Sunday, made the first mention of a new enlistment programme for R.A.F. aircrew, recruiting for which began on Monday.

There are now vacancies in all five aircrew categories, for the first time since before the end of the war. Although all candidates sign on for an initial engagement of eight years' active and four years' reserve service, there are provisions under the new scheme which draw a dividing line between pilots and navigators on one hand, and signallers and engineers and gunners on the other. The increasing responsibilities placed on pilots and navigators of modern military aircraft are recognized in the decision to award to them a greater number of commissions—some guaranteed to satisfactory candidates at their selection boards, and the remainder to suitable pilots and navigators serving as aircrew. All officers on the eight-year engagement will be considered for permanent commissions, normally in the sixth year. Gratuities paid on leaving the service at the end of eight years will be £100 for each year of commissioned service and £40 for each year of aircrew service as pilot or navigator.

Signallers, engineers and gunners will have opportunities of being selected as long-service aircrew, or may be awarded commissions in ground branches after completing the initial eight years' aircrew service. They will not, however, be awarded commissions in the General Duties Branch. It does seem that by this decision, necessary as it may be, there will be some loss of attraction to potential volunteers and lack of incentive to aircrew in these categories. Gratuities payable will be £32 for each year of aircrew service as signaller, engineer or gunner.

Volunteers must be between 17½ and 24 (25 in exceptional cases), fit, and of School Certificate standard.

A report on the selection tests for aircrew now carried out at R.A.F., North Weald, will appear in our next issue.

SATURDAY AT BELFAST

LARGE crowds were attracted to Belfast Harbour airport on September 11th, when the Northern Ireland Area Committee of the Royal Air Force Association held their second annual air display. Profiting from last year's experience, the marshalling arrangements were really efficient and the flying area was kept clear of spectators. Among distinguished visitors was Air Marshal J. W. Baker, C.B., M.C., D.F.C., who was representing the Air Ministry. The weather was patchy, with heavy showers falling at intervals which drove spectators to the static exhibition. Flying, however, proceeded according to plan.

As an introduction, all the aircraft taking part in the display flew past; then a Mosquito of the local Auxiliary squadron (No. 502) peeled off and treated the assembly to a display of aerobatics. This was followed by a Naval Sea Fury, piloted by Lt. Cdr. Paul Whitfield, who close-turned and rolled at high speed. The Navy followed this by a low-level bombing attack by a squadron of Barracuda 3s, led by Lt. Cdr. Patterson. Two of the Barracudas demonstrated RATOG; an Airspeed Consul, flown by W/C. Terry McCombe, obliged during a slight lull, until six Superfortresses of the U.S.A.F. made two courtesy fly-pasts.

Now came a demonstration of the Martin-Baker ejection seat, by Bernard Lynch, from a Meteor 3, piloted by Captain J. Scott, of the National Gas Turbine Establishment, who also demonstrated the handleability of the Meteor. A mock bombing attack, anti-aircraft defensive tactics, and a display of crazy flying by the Queen's University Air Squadron, concluded the afternoon.

COMPETITION IN AUSTRALIA

Ansett Airways are to continue with the reduced fares policy which was introduced on the Melbourne-Tasmania route for the period June to September. The company claim that patronage has been so good that the service can be operated profitably at the reduced rates. As announced in *Flight*, July 15th, both T.A.A. and A.N.A. have reduced fares on certain routes to meet competition from Ansett Airways, but on all other routes the 20 per cent increase in fares approved by the Australian civil aviation authorities is being retained.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

V.R. CENTRES WANTED IN THE WEST COUNTRY
Tigers Would be Welcomed

IN the issue of *Flight* for August 26th, 1948, one of your correspondents, Mr. A. J. Walker, is having a bind about the type of aircraft he has to fly in the R.A.F.V.R. It seems that he and many others are "browned off with Tigers."

For your information, Mr. Walker, there are many ex-R.A.F. pilots in the South West of England who would be only too pleased to have the opportunity of flying Moths, or any other old string-bags for that matter, but unfortunately the only school in this part of the country is at Filton, near Bristol. We had high hopes of a school starting at Exeter and perhaps one at Plymouth, but, like everything else, this is still "in the air."

Maybe if this matter could be brought to the notice of those concerned it might do some good, because, believe me, there are quite a few who are browned off with having nothing at all to fly.

REG. E. TITMUS.

Newton Abbot, S. Devon.

AIR ACCIDENT INVESTIGATION
Official Report Criticised

IT is encouraging to learn from Notice to Airmen No. 278, dated August 10th, that speech-recording apparatus is to be provided for Airport Control. This is undoubtedly an important step in the right direction, but it still does not answer the many and trenchant criticisms of the present method of investigating *and publicising* accidents to aircraft.

The report which has led directly to the provision of recording apparatus is that on the accident to a B.E.A.C. Viking at Ruislip on January 6th of this year (M.C.A.P.57). The report imputes blame to the pilot, although nowhere in the report is there direct evidence to this effect. At 9 p.m., it is stated—on January 6th, when it was pitch dark, with low clouds and rain—the aircraft "was heard flying at a low altitude." Later, the astonishing statement is made that ". . . an ex-pilot said that it (a Viking aircraft) passed over twice, and that he recognized it from the sound of its engines." In no case was the aircraft seen

The report goes on to record radio-telephone conversations between pilot and control. These are taken from the log kept by Airport Control, but there is no method of assessing their completeness nor their exactness, beyond the memory and the integrity of the Controller, whose job depends upon his efficiency. It is definitely stated that vital information was not passed to the Captain. It is stated that the time of certain calls could not be ascertained because they "were not entered in the Signal Log."

The only evidence adduced directly bearing on the pilot shows that:—

1. Two or three attempts were made to land.
2. In his training, the pilot is reported as having "misread signals" (in connection with radar-controlled approaches) but that he had "taken every opportunity in the air to practice beam approaches."

Direct evidence included in the report shows that:—

1. Airport Control had no knowledge of the vital significance of a rapidly falling barometric pressure—had they possessed this knowledge they would not have failed to pass to the pilot the relevant information.
2. There were serious omissions and inaccuracies in the Signal Log.

All the evidence in connection with the pilot tends to show that he lacked skill in the particular branch of flying under review. From this, the assumption is made that he failed to take certain steps. There is no direct evidence to this effect.

It is shown beyond dispute that there were serious errors and discrepancies in the actions of Airport Control. It is legally conceivable, although unlikely, that the pilot had passed some vitally important information which was not logged.

Certain "Conclusions" are drawn from the evidence. (i) to (iii) are fact, beyond dispute.

(iv) and (v) state that there was no mechanical failure. This is probably true, but is far from being beyond dispute, particularly in view of the proved inaccuracy of the Control Signal Log. In any case, it is gravely misleading to include statements (iv) and (v) under the same heading as statements (i) to (iii), thereby conferring to deductions the status of facts.

"Conclusion" (vi) is even less satisfactory, as it is based on the assumption of the investigating officer that the pilot adopted, knowingly and willingly, a certain course of action.

Items (vii) and (viii) deal with deficiencies in Control, and, being supported by direct evidence, are justifiable "conclusions."

Following the "Conclusions," the "Opinion" is given that the pilot should have asked to be directed to another airport. (There is, in fact, no evidence that he did not do so or try to do so.) It is also the opinion of the investigating officer that an incorrect altimeter setting (due at least partly to an omission on the part of Airport Control) "cannot be dismissed as a possible contributory cause."

In spite of the fact that the pilot's skill is in doubt, a fact which must be presumed to contribute to the assumption that he failed to take the correct action, no doubt whatever is cast upon the propriety of B.E.A.C. having appointed him Flight Captain at Northolt, in charge of all B.E.A.C. pilots on internal services. The lack of skill and knowledge on the part of Airport Control is dismissed by a glossed-over reference to an incorrect altimeter setting.

Although the pilot is stated to have committed an "error of judgment," on circumstantial evidence, in the face of direct evidence no similar or more serious charge is levelled against Airport Control, against B.E.A.C.'s judgment, or against the Ministry of Civil Aviation for its share of responsibility.

Let me state at once, there is no doubt as to the capability of the Chief Inspector of Accidents so far as technical investigation is concerned, and there is no possible doubt as to his integrity. Whether or not the report on this accident brings out the *probable* sequence of events, and Control deficiencies did not contribute materially, is beside the point. A dead man has been indicted on the assumptions of one man.

What is so disquieting is the publication of reports which impute blame to individuals—usually pilots—or to organizations, on evidence which has been neither given nor assessed according to the law of the land.

(a) Neither the Chief Inspector of Accidents nor any of his officers who conduct enquiries have legal qualifications.

(b) The Chief Inspector of Accidents belongs to the Ministry of Civil Aviation.

(c) The Ministry of Civil Aviation is responsible for all ground aids, including Airport Control, and has certain responsibilities regarding B.E.A.C. and the two other Government Corporations.

W. N. CUMMING, Deputy Master,
Guild of Air Pilots & Air Navigators.

Londonderry House,
London, W.1.

FORTHCOMING EVENTS

Sept. 18th to Oct. 3rd.—Copenhagen Show, organized by the F.B.I.
Sept. 18th and 19th.—Aero Club of Milan: Air rally, Forlanini airfield.
Sept. 19th.—Evere Aero Show, Brussels, Belgium.
Sept. 21st.—Aero Golfing Society: Autumn Meeting, Richmond Golf Club, Sudbrooke Park, Petersham, Surrey.
Sept. 25th.—S.L.A.E. (South Eastern Area): "Aviation Gasolines," by G. L. Coles, B.Sc., A.R.C.Sc., F.Inst.Pet., Manson House, 26, Portland Place, London, W.1, at 3 p.m.
Sept. 25th and 26th.—Butlin's Week-end Air Rally at Ingoldmells, Skegness.
Sept. 25th and 26th.—International air rally at Cervin, Sion, Switzerland.
Sept. 27th to Oct. 1st.—Fédération Aéronautique Internationale Conference, Paris.
Sept. 28th.—R.Ae.S. (Glasgow): Film Evening, Prestwick airport.
Sept. 30th.—Royal Aeronautical Society: Fourth British Commonwealth and Empire Lecture: "Some Economic Factors in Civil Aviation, with Emphasis on Civil Aircraft and their Prospective Trends of Development." Peter G. Masefield, M.A., F.R.Ae.S.
Oct. 6th.—Royal Aeronautical Society (at Birmingham): "Some Aspects of Power Plant Development" Dr. E. W. Still, B.Sc., A.F.R.Ae.S.
Oct. 13th.—R.Ae.S. (Hatfield) "Aircraft Photography," John Yoxall.
Oct. 15th.—Second International Air Ball at London Airport.
Oct. 21st.—Royal Aeronautical Society: "Cold Weather Operation of Aircraft," G. W. Wilson, A.F.R.Ae.S. and S/L. E. P. Bridgland, R.C.A.F., B.Sc., A.F.R.Ae.S.
Oct. 30th.—S.L.A.E. (South Eastern Area): "High Speed Flight," by W. A. Waterton, Manson House, 26, Portland Place, London, W.1, at 3 p.m.
Nov. 20th.—Joint Meeting Royal Aeronautical Society and Helicopter Association of Gt. Britain. Full day Discussion on Helicopters.
Nov. 27th.—S.L.A.E. (South Eastern Area): "Gas Turbine Power Plants," by D. H. Mallinson, B.Sc., Manson House, 26, Portland Place, London, W.1, at 3 p.m.

SERVICE AVIATION

NAMELESS NEWCOMER: Britain's formidable selection of interceptors has been further strengthened by the new Hawker N.7/46 Naval fighter, claimed to have an unusually long range in addition to its already proven high speed and manoeuvrability. Details of the N.7/46 appear in "Military Aircraft Notes" on p. 340 of this issue.

Royal Air Force and Naval Aviation News and Announcements

Appointments

AIR VICE-MARSHAL W. L. DAWSON, C.B., C.B.E., has been appointed Commandant of the School of Land/Air Warfare, Old Sarum, with effect from October 18th, 1948. A.V-M. Dawson has been A.O.C. Air H.Q., Levant, since September, 1946.

Air Commodore J. S. Griffiths, C.B., C.B.E., has been appointed Senior Service Accountant at the Air Ministry. Formerly Command Accountant Officer for Technical Training Command, A. Cdre. J. S. Griffiths succeeds A. Cdre. H. F. Fuller, who is retiring.

The following appointments in No. 66 (Scottish Reserve) Group have also been announced. G/C. J. S. Newbigging is to be Senior Air Staff Officer of No. 66 Group, and will also act as Deputy to the Air Officer Commanding. W/C. W. C. Ollason will be Senior Officer in Charge of Administration, and W/C. M. G. Pearson has been appointed Commanding Officer of No. 3603 (City of Edinburgh) Air Defence Unit.

"Thor II" for Canada

A LIAISON team of officers selected from the Air Ministry, the Empire Air Armament School, and the Central Gunnery School, was due to leave last Saturday in the Lincoln *Thor II* on a visit to Canada, flying via Prestwick and Goose Bay to Ottawa.

The purpose of the visit is to demonstrate to the R.C.A.F. the latest armament devices and to exchange views on air weapons training. The team, led by G/C. C. M. Heard, C.B.E., Deputy Director of Training (Weapons) at the Air Ministry, consists of S/L. F. A. Coleman, Weapons staff, E.A.A.S.; S/L. C. F. Bradley, D.S.O., pilot attack instructor C.G.S.; S/L. T. B. Jones, Directorate of Armament, Air Ministry; F/L. R. McCurdy, D.F.C., Gunnery Leader, E.A.N.S.; and the Rev. R. W. Hanson, padré at the E.A.A.S.

S/L. K. G. Hubbard, D.F.C., is captaining *Thor II*, the remainder of the crew are: Plt. II P. N. Farley (2nd Pilot); F/L. S. W. Close, D.F.C. (Navigator—he will also lecture on radar during the tour); F/O. E. C. McClelland-Hope (Flight Engineer); P/O. N. J. Gardner (Wireless Operator); and Sgt. C. Allan (Fitter).

Thor II is fitted with the latest armament and radar equipment, and has already flown more than 90,000 miles on similar visits.

Refresher Courses for Reserve Officers

REFRESHER training courses lasting fifteen days (which may be reduced to seven days in exceptional cases) are to be held for ground officers of the R.A.F.O. and R.A.F.V.R.

Former flying-control officers will go to stations where flying control systems are in operation. Fighter controllers will normally go to a sector operations centre, or ground control interception stations in Fighter Command; there will also be vacancies at the Control and Reporting School at Middle Wallop.

New Brevets for R.C.A.F.

THE Royal Canadian Air Force is introducing two new types of flying badge, so that all aircrew will wear double wings. Previously only pilots wore the full wings and other aircrew received the single-wing badge as in the R.A.F. The R.C.A.F. has now only three categories of aircrew, pilot, radio-officers and radio-navigators. First of the new radio-officers' wings have been awarded to classes passing out from the radio school at Clinton, Ontario. Single-wing badges previously awarded will be retained until the wearers are trained under the new categories.

More Vampires in U.S.A.

PILOTS of the R.C.A.F. gave crowds at the Cleveland National Air Races an example of the amazing high-speed aerobatic qualities of the Vampire 3 on the 4th, 5th and 6th of this month. Two Vampires took part in the flying display and a third was on view in the static exhibition.

V.I.P. Valetta

VICKERS are producing for Transport Command a V.I.P. version of the standard Valetta equipped to carry from nine to fifteen high-ranking officers or other important personages in a single large cabin. Range has been increased to 1,347 miles and 20 per cent reserve in still air at a height of 10,000 feet and normal cruising speed. This permits use of the V.I.P. Valetta over all normal trunk routes, and a distance such as a non-stop flight to Malta.

Normal seating is for nine passengers in three rows of three seats in the forward portion of the cabin, the rear part containing two tables and six chairs for meals or conferences. Alternatively, fifteen passengers are carried, the chairs and tables giving place to six passenger seats. All seats may be adjusted to two positions and are built to withstand a load of 25 g. Furnishing and upholstery

Service Aviation . . . . .

are in brown Vynide, with a matching carpet.

Every necessity for comfortable air travel is provided, including fibreglass insulation of the cabin, heating, ventilation, cold air and oxygen supply.

In the rear of the aircraft are a toilet, a luggage compartment, and a steward's pantry, fitted for serving prepared food and drinks during flight.

Smart Lads Wanted

NAVAL Aviation, now absorbing more than 25 per cent of the Navy's manpower, will benefit from the new Admiralty decision that boys between 15 and 16 will now be able to join almost any branch of the Navy. Previous entry age was 17½, and it is considered that many hundreds of potential recruits have been lost through boys finding other occupations by the time they have reached this age.

Fixed Working Week

FOLLOWING a review of the subject by the Air Council, the R.A.F. working week has now been fixed at 44-47 hours, depending on local and seasonal conditions.

In a 44-hour week, actual tradesman's work should occupy a minimum of 33½ hours; nine hours are allotted to parades, ground combat training, compulsory sport, education, and like activities, and the remaining one and a half hours are allowed for "Naafi break." If a man cannot be found employment in his own trade during the minimum working time he is to be employed on other duties to the best advantage.

"The Regiment" Needs Gunners

THE R.A.F. Regiment is hampered in its function of providing defence for R.A.F. airfields and installations by a shortage of personnel, particularly gunners. Bofors-armed light A.A. squadrons, and armoured-car, rifle and mortar squadrons make up the main formations of the Regiment, which is also responsible for all ground combat training within the R.A.F.

Regular enlistment is made for a minimum period of five years, and there are opportunities of being commissioned from the ranks. Men joining the Regiment complete the normal initial training at R.A.F. recruit centres before training at the R.A.F. Regiment Central School at Catterick, Yorks.

Permanent Commissions

THE following officers have been selected for permanent commissions in the R.A.F. in the branches shown:

GENERAL DUTIES BRANCH

Wing Commanders: A. F. Binks, D.F.C., N. M. Boffee, D.F.C., G. A. Brown, D.F.C., R. C. H. Crosthwaite, W. G. Gardener, D.F.C., A.F.C., G. H. B. Hutchinson, D.F.C., W. L. Jones, D.F.C., G. F. Lerwill, D. Mackenzie, D.F.C., T. C. P. Maxwell, D.F.C., H. G. Mossford, B. E. Peck, D.F.C., M. J. A. Shaw, D.S.O., J. Stewart, D.F.C., F. M. Thomas, E. F Tonge.

Squadron Leaders: R. I. Alexander, D.F.C., R. N. Ayles, D.F.C., D.F.M., R. Bailey, A.F.C., G. C. Banning-Lover, J. Brain, A.F.C., J. H. S. Broughton, A.F.C., K. C. Browne, J. G. Cole, D.F.C., R. A. Colville, E. Coton, D.F.C., A.F.C., E. H. Dally, P. F. McD. Davies, D. S. Dickens, E. G. R. Downey, D. H. L. Farmer, D.F.C., A.F.C., P. G. D. Farr, D.F.C., H. J. Fitz, J. Garden, J. D. Hawkins, J. A. Hemingway, D.F.C., E. W. F. Hewett, A.F.C., D.F.M., S. R. Hyland, E. K. P. Ince, D.F.C., A. D. Jillings, J. Lomas, D.F.C., A. D. McLaren, D.F.C., J. R. Mason, W. G. New, C. O. J. Pegge, D.F.C., E. D. Pennington, J. E. Proctor, D.F.C., R. J. V. Smyth, D.F.C., R. H. Steel, O.B.E., L. Terry, E. F. Thornicroft, A.F.C., D.F.M., A. G. Todd, D.F.C., E. L. West, P. L. Whitaker, D.F.C.

Flight Lieutenants: J. M. Ayshford, D.F.C., J. B. R. Battle, N. E. Bowen, G. W. Brain, D.F.C., J. Campbell, M. A. Clancy, J. J. Cooper, J. G. Drinkwater, E. Edge, P. J. Evans, H. Fell, P. G. Gladstone, D. W. Guy, E. D. Herbert, A.F.C., W. H. Hewlett, R. F. Hitchcock, P. Hoare, A. C. Langdon, N. Lawson, J. R. Musgrave, G. E. R. Parr, J. K. Rogers, D. F. C. Ross, G. M. Rothwell, D.F.C., F. E. Rymills, D.F.C., D.F.M., G. J. South, D.S.O., D.F.C., D. M. Surtees, E. Trees, D. R Turley-George, D.F.C., G. W. Turner, D.F.M., D. R. Ware, D.F.C., A. F. Wilson, D.F.C., D. R. Wilson.

Flying Officers: R. Bowie, G. C. Cairns, H. D. Carver, F. H. P. Cattle, P. Fawkes, D. B. R. Hill, H. G. Huyton, T. J. McElhaw, A. E. Shepherd.

TECHNICAL BRANCH

Wing Commanders: A. G. Cork, M.C., L. W. Tee, M.B.E.

Squadron Leaders: A. D. Adams, W. G. Ahern, C. W. Allsop, F. W. Avery, R. J. Bedells, H. C. J. L. Connelly, R. C. Fordham, G. A. Fricker, H. W. Furness, C. F. Mills, A. C. Nisbet, W. C. H. Oatley, M.B.E., H. W. Osborne, M.B.E., K. S. J. Rancombe, A. E. Spring, C. E. G. Tomkins, L. F. Woolcott, J. Wright.

Flight Lieutenants: J. F. Ball, R. E. Bracher, A. V. Breese, H. G. Dimmer, R. Duckworth, J. Edwards, F. H. Fearnside, S. R. Hawkey, R. H. Insley, M. T. Judson, R. A. Leonard, T. J. McAndrew, F. C. Norman, L. W. Schalkins, J. E. Smith, W. Sparrow, M. W. Stall, G. C. Stickland, E. F. Withington.

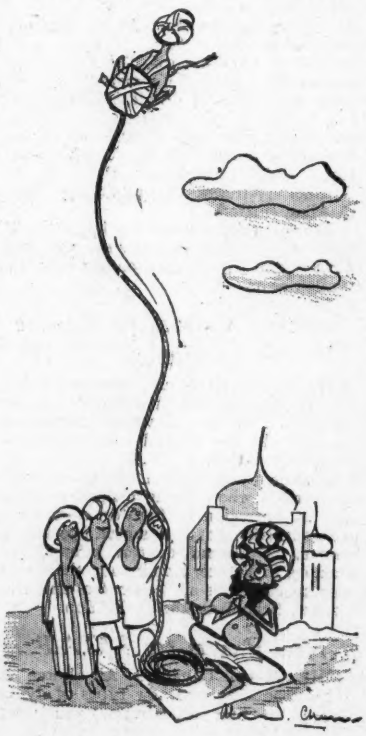
SECRETARIAL BRANCH

Wing Commanders: H. J. Cowley, L. A. Dawson, A. Johnsone, H. C. Smith, A.F.C., D.F.M.

Squadron Leaders: W. H. Angus, R. W. Baldwin, J. Fifield, E. F. Hart, F. G. Henderson, E. T. G. Howlett, R. B. P. Land, A. Leitch, E. G. Libbey, D. McFarlane, O.B.E., D. N. Rothwell, J. K. Snowdon, E. H. Stamp, A. F. Wearn, J. Wiles.

Flight Lieutenants: A. S. H. Evans, W. M. Jamieson, M.B.E., J. N. King, K. Lounds, W. G. Martin, I. E. Miller, L. H. Poltock, A.F.M., R. A. J. Talbot.

SILVER SUITS: To resist the ravages of aviation kerosene on "working blue," a new type of overall, as worn in this illustration, has been made from balloon fabric for ground crews of Fighter Command, whose appearance now matches the glistening Meteors and Vampires in their charge.



Reunions

THE second reunion for all ex-members of No. 2 Ferry Pool, A.T.A., will be held in Bristol on Saturday, Oct. 30th. Tickets 10s each from Michael Ward, 103, Greenway Rd., Taunton.

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There will be a reunion of personnel of No. 570 Squadron and No. 6570 Servicing Echelon in London on December 4th, 1948. Details from F. G. Berg, 38, Palace Road, London, N.8.

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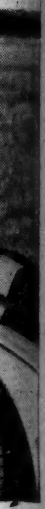
A reunion of officers who served with No. 4 Naval Fighter Wing between October, 1943, and October, 1945, is to be held at Christmas. Any ex-Wing member interested should contact Lt. G. C. Baldwin, D.S.C., R.N., Ward Room, Lee-on-Solent, Hants.